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(*Continued.*)

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The proceedings of the Conference commenced with an address by the President, Alderman W. Cook, J.P., Chairman of the Health Committee, Birmingham, which was published in the Journal, Part III., Vol. XIX.

"*Dwelling Accommodation in Large Cities*," *by* John F. J. Sykes, M.D., D.Sc.
(Fellow.)

In considering the human dwelling, it is frequently the custom to commence at the putative beginning of the world, or at the least at the cave age when the dwelling was a mere shelter from the weather, and the reader or hearer mentally recalls Molière's exclamation, "passons au deluge," therefore let us span time and pass directly to the human wants of the present day.

Although it must be granted that the evolution of the human dwelling regarded as a structure is of primary importance, yet from the point of view of the dwelling accommodation required by modern civilised beings, it may be profitable to review the subject from a social as well as a structural aspect, since usage and sanitary precautions must form the basis of structural accommodation.

With this idea in view, the functions and requirements to be provided for the individual in the modern dwelling must be first called to mind. These are in approximate order of greatest necessity: (1) sleeping, (2) food-storage, (3) cooking, (4) warming, (5) excretion, (6) ablution, (7) clothes washing, (8) deposit

of refuse, (9) open space for refuse, drying clothes, &c., (10) bathing, that is, not partial but total ablution of the body, (11) living, including reading, writing, work, recreation, &c., for brevity called living. The list might be continued to a considerable extent, but that some limit must be placed by restricting it to what is more necessary rather than to what would be most desired.

In the next place it is advisable to picture the possibilities, whether desirable or not, of the case of a single individual living in one room. Diogenes was contented in a tub, but to-day such a dwelling would be promptly represented as unfit for human habitation. Nevertheless, many single persons live in one room, so let us glance at the interior of such a dwelling, the purposes it subserves, the provision made for these purposes, and the provision that would be required if separate rooms or places were provided for these purposes. In order to make this aspect clear, let us throw this into tabular form in the simplest manner.

Purposes.	Provision in a Single Room.	Provision in Separate Places.
1. Living	Table and chairs	Parlour.
2. Sleeping	Bed	Bed-room.
3. Food Storage	Cupboard (ventilated into open air)	Larder.
4. 5. Cooking and Warming	Range	Kitchen.
6. Ablution	Draw-tap and sink	Scullery.
7. Clothes washing	Wash-tub	Washhouse with Copper.
8. Bathing	Bath or tub	Bath-room.
9. Deposit of Refuse	Pail	Bin.
10. Open Space (for drying clothes, storing refuse, &c.	Window cill	Yard or Balcony.
11. Excretion	W.C.	W.C.

(The last must in any case be separately provided for.)

It will be at once apparent that it is possible to cram all these purposes and appliances into a single room *except the last*, and it is much to be regretted that in our cities and large towns endless illustrations of this condition are to be found, under which not only individuals but whole families exist, for they can scarcely be said to live in the true sense of living.

These are nothing but mere truisms, nevertheless, something is gained in setting out in detail what we have to deal with, and being able thus to picture the position. It enables us from this basis to proceed, step by step, to what we are aiming at, namely,

to form some idea of the provision necessary to be made for those who cannot and know not how to provide for themselves.

Existence in a single room for a single man or a single woman may be possible, but for families whose children will become future citizens and form the bulk of the nation it is utterly impossible without degradation and decadence. From a social and national point of view therefore the celibat whose existence terminates with life becomes of infinitely little consideration beside the families that carry on the nation from generation to generation.

Too strong an emphasis cannot, therefore, be laid upon the great fact that above all things in providing dwelling accommodation healthy family life must be most encouraged and bettered, and that no amount of collective accommodation for men only, or women only, will touch this great question.

It is at once apparent that the differences of sex and age are the factors that render family life impossible in a single room, and that in the erection of dwellings for families single-roomed dwellings are out of consideration. We must, therefore, start with the two-roomed dwelling, the very minimum family accommodation possible, and it must be recognised that family life entirely carried on in two rooms cannot be regarded as a sufficiently high standard of "home" in which the bulk of the young population of the nation should be reared and trained as future citizens, however humble their walk in life.

As both of these rooms may sooner or later require to be used as bedrooms we must further consider how the second room may have removed from it such provision as may be made elsewhere. If we refer to the tabular statement we shall see at a glance that food storage, cooking and warming, ablution, and clothes washing, may be so removed to a combined kitchen, larder, scullery, and washhouse, and so we reach a three-roomed self-contained dwelling. The possibility of installing a food cup-board, a cooking range, a draw-tap and sink, and a washing copper in the same room must be admitted.

The combination of kitchen, larder, scullery, and washhouse, has this great disadvantage, that the room being applied to so many purposes it cannot well be used for any other. The separation of this into two rooms, a scullery and a kitchen, enables the kitchen to be freed from the other purposes and to be usable as a living-room, this in turn dispensing with a bedroom being so used, as must of necessity otherwise be the case. Here then we reach the four-roomed self-contained family dwelling.

In this direction happily it is that progress is being made, and in proof of this some figures of Dr. J. B. Russell, the well-

known Medical Officer of Health of the City of Glasgow,* who has done so much good work in this direction, must here be quoted. In a digest of the "Census, 1891, Glasgow," he records the percentage proportion of the population living in dwellings of one, two, three, four, and five or more rooms in that City, at successive census periods, to these I have added columns showing the percentage increase or decrease, and the results as set out in the following table are of extreme interest.

Dwellings of.	Census, 1871.	Difference 1871—81.	Census, 1881.	Difference 1881—91.	Census, 1891.	Difference '71—91.
1 Room	30.4	−5·7	24·7	−6·7	18·0	−12·4
2 Rooms	41·5	+3·2	44·7	+2·8	47·5	+ 6·0
3 „	13·2	+2·8	16·0	+3·7	19·7	+ 6·5
4 „	5·8	+0·3	6·1	+1·1	7·2	+ 1·4
5 „ and upwards	9·1	−0·6	8·5	−0·9	7·6	− 1·5
	100·0		100·0		100·0	

During the twenty years 1871 to 1891 there was a continuous and increasing diminution in the proportion of persons living in dwellings of one room, and of five rooms and upwards, to the total number of persons living in all dwellings, this being especially marked in the case of the one-room dwellings. On the other hand, there was a steady increase in the proportion of persons living in two, three, and four-room dwellings during the twenty years; the persons living in four-room dwellings, as well as those in three-room dwellings, showing a continuous and increasing proportion, the greatest gain of all being ultimately in the three-room dwellings. But the remarkable point is that, whereas in the decennium 1871-81 the proportion of persons living in two-room dwellings increased 3·2 per cent., and the proportion in three-room 2·8, in the decennium 1881-91 the porportion in two-room dwellings only increased 2·8, whereas the proportion in three rooms rose 3·7 per cent.

Above all towers the notable fact that the proportion of persons living in one-room dwellings fell between 1871 and 1891 from 30·4 to 18·0 per cent. of the total number of the population, and it is significant that the increase of proportion appears to be converging from both directions towards the three and four-roomed dwellings.

Unfortunately no such valuable comparative figures are available for England and Wales, or any English towns, Dr. J. B. Russell's method having only been adopted at the last

* Now adviser to the Board of Supervision, Scotland.

census in 1891. At that census the following table shows the percentage of population living in tenements of one, two, three, four, and more rooms in the whole of England and Wales, in the rural districts, in the urban districts, in St. Luke's, one of the most crowded, and in Lewisham, one of the least crowded districts in London.

Dwellings of.	England and Wales.	Rural Districts.	Urban Districts.	St. Luke's.	Lewisham.
1 Room	2·2	0·44	2·89	21·8	5·2
2 Rooms	8·3	5·65	9·38	29·9	6·7
3 "	11·1	10·06	11·54	19·1	9·1
4 "	23·5	26·26	22·42	9·3	11·0
5 " or more	54·9	57·59	53·77	19·9	68·0
	100·0	100·0	100·0	100·0	100·0

Comparing the St. Luke's figures with those of Glasgow in 1891, the former had about the same proportion of population housed in three rooms, and a slightly larger proportion in four rooms, a very much larger proportion in five rooms and over (possibly due to a larger number of public institutions), and a much smaller proportion in two rooms, but a somewhat larger proportion in one room.

Comparing Lewisham with St. Luke's the great difference is that in Lewisham 53·8 per cent. less of the population live in one and two rooms and 56·8 per cent. more in five or more rooms than in St. Luke's. This no doubt is due to the difference between the classes inhabiting a semi-rural and choice residential suburban district as compared with a crowded central area in a large city.

The normal proportion of urban population living in the several roomed dwellings it would be extremely difficult to estimate, dependent as it must be upon the size of the rooms, and the number of rooms in the dwelling-houses. This applies particularly to the one-roomed and the five or more roomed tenements or dwellings, since common lodging houses, homes, boarding houses, hotels, clubs, and other houses in which more or less associated life is led must largely diminish the proportion of persons living in one-roomed and correspondingly increase the proportion in five or more roomed dwellings, but amongst the bulk of the population would have less effect upon the proportion living in two, three or four rooms, that is, humble family life.

To revert again to our ideal self-contained large family dwelling of four rooms, namely, two bed-rooms, a kitchen and living

room, a scullery, washhouse and larder, and a w.c., with yard or balcony, is it possible to reduce the number of rooms to economise upon the rent? It is plain that if the family is very small one bed room may suffice, and the number of rooms be reduced to three, constituting what may be regarded as our ideal self-contained small family dwelling.

Now comes the question—can any further reduction be made and how? At some sacrifice of family life and independence in the construction of buildings containing numerous dwellings, another room may be lopped off by setting the larder in the kitchen wall opening to the air, and constructing a scullery and washhouse for the common use of several families, and where this form of construction is adopted the w.c.'s are treated in a similar manner. In some cases the scullery is also separated from the washhouse, the scullery being placed close to the dwellings, and the washhouses collected together at a distance. This class of dwelling-houses may be better known as houses of associated dwellings in contra-distinction to houses of self-contained dwellings. It is important that the water-tap and the w.c. should be as nearly accessible to the dwellings they serve as possible, in every case on the same floor of the building, and that such provision should be made for every twelve occupants or less. It is almost unnecessary to add that the water supply and drainage should strictly conform with official regulations, for in buildings where the number of occupants is multiplied the danger incident to defects is proportionately increased.

We have now reached a point at which it becomes apparent that in providing *family* dwellings we may differentiate between two classes of "houses constructed in separate dwellings," or common-stair dwelling-houses, the one consisting of three and four-room self-contained family dwellings, the other of two and three-room associated family dwellings. And I venture to think that wading through these details is amply repaid by the clearer conception we obtain of the conditions to be provided for in new dwelling-houses in crowded cities.

1. Single or widowed individuals of the same sex (*a*) living and sleeping in common, as in a common lodging-house, or (*b*) living an associated life in one dwelling-house, as in a house with separate bed-rooms and common living-rooms.

2. Families living in associated dwellings in one building, partly a family life, partly an associated life, the association being confined to certain necessary accessories.

3. Families living a truer family life in self-contained dwellings in a common-stair house.

Some points with regard to perflation and ventilation must not be overlooked here. Dr. Arthur Newsholme some years

ago in a paper read before the Royal Statistical Society, showed that, in London, houses constructed in separate dwellings, or common-stair dwelling-houses, appeared statistically not to have any particular influence upon health except in this respect, that they produced a greater prevalence of those forms of infectious diseases for which there is no hospital provision, such as measles, whooping-cough, etc. The lesson to be learnt from these statistical researches is that the staircases and passages of such houses must be so constructed as to be fully and permanently open to the outer air. This necessity is the more obvious when it is pictured that the separate dwellings all open on to the common stair and passages, and that the dwelling-rooms of each dwelling are also all in direct aerial communication with each other and are not separated by a ventilated staircase-well as in the older type of house.

The statistical researches of Dr. Tatham, Superintendent of Statistics at Somerset House, when Medical Officer of Health for Manchester, into the mortality and morbidity of back-to-back houses, furthermore point to the necessity for having through ventilation to each dwelling, that is, that a back-to-back type must not be adopted, but that one or more of the rooms of each dwelling must be situated on the opposite front of the building to the other room or rooms, so as to allow of thorough perflation when windows and doors are opened.

In this connection it need scarcely be added that no w.c. should have direct aërial communication with any room of a dwelling, and especially where the rooms are in direct aërial communication with each other, and furthermore that every dwelling, on whatever story it is situated, should have direct access to a modicum of open space in the form of a yard or balcony wherein to place refuse or any objectionable matters, and for other purposes. In planning, this open space may be made the means of cutting off the w.c. from aërial communication with the dwelling.

As to open spaces at the front and rear of the building it is now accepted that these should be as wide, and may be half as wide again, as the height of the house.

It may be convenient to add at this stage that although occasionally large tubs and baths may be seen in use in the class of dwellings under consideration, the inconvenience of restricted dwelling space militates against them. The erection of baths in corridors and spare corners has not met with successful application, and the only provision that appears to succeed in connection with large blocks of separate dwellings is the erection of a separate building fitted with baths and furnished with hot and cold water under the care of an attendant.

To this building also may be conveniently added another containing the wash-houses of associated dwellings.

Now we come to the question of cubic space, and this divides itself into (1) the cubic capacity or size of dwelling rooms, and (2) the cubic space per head.

Although it has been necessary for the purpose of lucid description to regard a scullery and wash-house as a room, it is not a fit place for living or sleeping in and cannot be included in the term dwelling-room.

One of the principal points governing the size of dwelling-rooms is the means of ventilation, and the smaller a room the greater the difficulty of ventilating it, so that restriction must be placed upon the reduction of the size of such rooms in new buildings. The minimum standard height now generally adopted is 9 feet, and the minimum area 96 square feet, say 12 ft. by 8 ft., or 11 × 9, or 10 × 10, a cubic capacity of something under 900 cubic feet.

The cubic space per head is the most difficult point of all to deal with in practice, and must be regarded sanitarily as the most important.

In 1851 the Common Lodging Houses Act was passed which placed the control of common lodging houses in the hands of the police with power to make bye-laws. At this period there was no doubt some difficulty in fixing the minimum amount of cubic space per head to be enforced, and it appears to have been fixed successively at 240, 260, 280, and 300 cubic feet, at which point it stands at present. It would be interesting to know how this amount was reached, and it is a curious coincidence that if we measure a bedstead 6 ft. long with a 2 ft. gangway at the bottom, and 2½ ft. wide with a 1½ ft. gangway at the side, we arrive at an area of 8 ft. by 4 ft., the minimum amount of floor space in which it is possible to put an approachable bedstead, and if this be multiplied by 7½ feet the minimum height probably adopted at that period, since cellar dwellings of a less height than 7 feet were illegal, we arrive at a cubic space of 240 cubic feet, and it requires but the addition of a few inches to each dimension to raise this space to 260, 280 and 300 cubic feet. It is highly probable, therefore, that this minimum was a purely mechanical calculation in packing, the physiological requirements of the human subject being overlooked.

Three hundred cubic feet still remains the minimum standard of cubic space for sleeping rooms. It is true that a recent Factory and Workshop Act only provides for 250 cubic feet per head and 400 cubic feet during overtime, but a person awake has more control over the condition of the air breathed, than a person asleep for perhaps seven or eight hours at a stretch. The Local

Government Board's Model Bye-laws provide for 400 cubic feet in registered tenement rooms, used both for living and sleeping, and the 300 is recommended to be increased in the dormitories of common lodging-houses that may require it.

The Glasgow and Edinburgh Authorities require in one and two-roomed dwellings in ordinary houses the provision of 400 cubic feet of space for adults, and half the amount for children under ten years of age. In barracks 600 cubic feet are provided per head by the Army Regulations.

Many years ago the late Dr. Edmund Parkes showed that, calculated on a physiological basis, the human adult required 1,000 cubic feet of space, because in order to maintain the air in a sufficient state of average purity in a dwelling-room it was necessary to supply 3,000 cubic feet of air per hour, and the air in this climate could not be changed more often than three times per hour.

We are continually bemoaning the large death-roll of consumption or tubercular phthisis, essentially a disease spread by crowding, and the medical profession is now strongly advocating the *cure* and *mitigation* of the disease by fresh air treatment. Is it out of place to advocate even more strenuously the *prevention* of the disease by fresh air, by the provision of more cubic space, and especially by raising the present inadequate minimum standard?

The adoption of the maximum as a working standard is scarcely practical, but it is practicable to advance the minimum standard to 400 cubic feet at the very least for adults, and if the lauded fresh air treatment means anything, it means, firstly, a decided step in this direction and a legal definition of overcrowding, the omission of which in our Public Health Acts is a serious flaw.

A standard of two persons per room is adopted in schemes for re-housing, and in census returns for measuring overcrowding. With regard to the latter it gives no idea of the amount of cubic space per head, inasmuch as the sizes of the rooms are not known. In reference to the former, to design dwellings allowing five, six, or seven hundred cubic feet per head, without providing any means of preventing this allowance being reduced, is practically futile.

Nearly half the population of this country lives in dwellings of four rooms or less in either single, dual, or multiple houses. Some of these cannot be registered under bye-laws, and even if they all could be registered, it would be unreasonable to register the dwellings of half the population simply for want of a proper definition of overcrowding.

It is not to be expected that Public Authorities can own the

dwellings of half the population. The only thing that can reasonably be expected of Public Authorities is the clearance of the worst areas and the erection of better dwellings to house a small part of the population, but especially to act as models for others who are erecting or intend to erect new buildings of a similar class.

How are Local Authorities to control these numerous new buildings as to cubic space occupied after they are constructed, since overcrowding is not a question of construction? It can only be done on a sufficient scale by a statutory definition of overcrowding, and nothing short of 400 cubic feet per head for adults will be satisfactory, although it may be reluctantly reduced to half the amount for children under ten years.

It is most essential to practical working that this minimum standard of cubic space be made to apply to all rooms used for sleeping purposes, whether occupied also as living rooms or not, because it is practically impossible in a large number of cases to differentiate, and where such differentiation is attempted it fails in that it has no permanency.

Therefore the matter of cubic space is above all important to re-housing under the Housing of the Working Classes Act, 1890, and the granting of certificates of suitable accommodation and sanitation under the Customs and Inland Revenue Acts, 1890 and 1891, which practically means in the building of all new dwellings for the working classes. To erect and certify buildings is one thing, to prevent them from being used other than in the manner intended is quite another thing; and we are living in a fool's paradise if we think that we are going to succeed in providing the working classes with more breathing space without having the means of preventing it being compressed to its original proportions. The pressure of population inevitably tends to squeeze the people closer and closer together, and the only check to this disease-producing pressure is the minimum limit imposed by law and vigilantly enforced by inspection. If we raise the standard of construction in the matter of cubic space and do not also increase the minimum limit to prevent crowding, pressure of population will in time inevitably reduce the condition of new dwellings to that of old, and the vast expenditure of time and money throughout this country will have been in vain. Therefore I plead strongly for this statutory definition and this increase.

"*The Removal of Insanitary Areas and the Management of Improvement Schemes under the Housing of the Working Classes Act*," *by* Peter Addie, F.S.I.

The subject of the removal of insanitary areas has received the attention of Parliament for many years. In 1851 The Labouring Classes Lodging Houses Act was passed, and between that date and 1868 five other Acts of Parliament became law.

In the year 1875 all these Acts were repealed and their provisions were consolidated and extended by the Artisans, &c., Act.

This Act is entitled "An Act for facilitating the improvement of the dwellings of the working classes in large towns," and it recites that portions of many cities are so built, and the buildings so densely inhabited as to be highly injurious to the moral and physical welfare of the inhabitants; and it also mentions that a great number of houses, courts, and alleys are unfit for human habitation by reason of the want of light, air, and ventilation, and proper conveniences, and that fevers and disease are caused, and sometimes result in death. Then as a reason for legislation it states that these houses, courts, and alleys are frequently the property of several owners, and consequently that it is not in the power of any one of the owners to make such alterations as are necessary for the public health.

The Act conferred on local authorities power to make an improvement scheme in respect of any area represented to them by their Medical Officer of Health as being unhealthy. The whole of this Act of 1875 has been repealed by the Housing of the Working Classes Act, 1890, and its provisions have been re-enacted and extended by this latter Act.

It may be well, before entering upon any discussion of the practical working of improvement schemes, to briefly examine the provisions of the existing Act of 1890. As may be remembered the Act is divided into three parts.

Part 1 deals with the removal of insanitary areas and the formulation of improvement schemes properly so-called.

Part 2 provides the machinery for the removal of obstructive dwellings, and for the closing of unhealthy isolated houses or small groups of houses belonging to one owner.

Part 3 of the Act deals with the provision of lodging houses for the working classes.

I propose to direct attention principally to Part 1 of the Act, and to give examples of the practical working of the various improvement schemes which have come under my own observation, and I also propose to touch briefly on the provisions of Parts 2 and 3.

It is interesting to note that while the existing Act and its predecessors were designed for the express object of housing the working classes, they have been used chiefly as towns improvement Acts, and municipalities have endeavoured, wherever possible, to escape the task of erecting artizans or labourers' dwellings. The reason is not far to seek. It is much easier to demolish buildings and lay out streets than to design dwellings which satisfy the desire of the working man, and at the same time are not too great a tax on the suffering ratepayer.

When an insanitary area has been discovered the first step towards obtaining its removal is to induce the Medical Officer of Health to make an official representation to the Local Authority that its sanitary defects cannot be effectually remedied except by an improvement scheme, for the re-arrangement and reconstruction of the streets and houses within such area, or some of such streets or houses. The reasons which may actuate the medical officer in making his report are either: (*a*) that the houses, courts, or alleys are unfit for human habitation, or (*b*) that the narrowness, closeness, or bad arrangement of the streets or houses, or groups of houses, or the want of light, air, ventilation, or proper conveniences, or any other sanitary defects, are dangerous or injurious to the health of the inhabitants on the area, or to the inhabitants of the neighbouring buildings.

The Local Authority must then take this representation into their consideration, and if satisfied "of the truth thereof and of the sufficiency of their resources," they must declare the area to be unhealthy and formulate an Improvement Scheme. It will be observed that the Local Authority will not be justified in making a scheme, if by so doing they will be unduly jeopardising their finances.

The sanction of the Local Government Board to the scheme by means of a provisional order must be obtained in the usual way, and the subsequent confirmation by Parliament is necessary. Great care must be observed in preparing the plans and estimates, and the notices required by the Act must be served on the owners, lessees, or occupiers. It should also be noticed that the scheme may be opposed either at the Local Government

Board inquiry or in Parliament when the confirming Act is under consideration, and it should be borne in mind that costs may be awarded either against or for the promoters, in the discretion of Parliament, if the opposition is or is not deemed justifiable.

Before sanctioning a scheme it is the almost invariable practice of the Local Government Board or Parliament, to require the provision of suitable dwellings for the persons living on the area, who will be displaced by the improvement; and there can be no question but these stipulations of the Local Government Board have caused more disputes and irritation than any other act of that cumbrous and antiquated body. In fact, as these stipulations are always encountered, it is wise for the local authority to have some clear and definite idea as to what provision they will make for the displaced population before they submit their improvement scheme to the Local Government Board. As I have said great care must be exercised in the preparation of the scheme; for innumerable difficulties frequently arise in its execution, which might have been avoided if a little more thought had been expended in its preparation.

In my capacity of Surveyor to various local authorities, several of these difficulties have come under my notice, and I will call attention to one or two of them. In laying out streets the width of the side streets is too often forgotton. Not infrequently a good broad street is laid out with narrow streets running into it. As the traffic in the large street increases, the use of the side streets grows; and then, when it is too late, the small streets are found to be inadequate, and a further costly improvement has to be effected. In the laying out of streets most useful lessons can be learnt from the German towns. For example, the new portions of Strassbourg are admirably designed. Again the subsequent disposal of the land should be borne in mind, and, if possible, the streets should not cut up the land into awkwardly shaped plots which are difficult to build upon. In my opinion it is useful to lay out a Circus on the London principle, where several streets meet; for it prevents congestion of traffic, and is beneficial financially, as it increases the frontage to the street, and consequently the value of the land.

Having obtained sanction to the scheme, it is presumed that the local authority will lose no time in putting it into execution. The first step is to acquire the land. In the event of negotiations breaking down, the local authority may apply to the Local Government Board for the appointment of an Arbitrator to

assess the amount of compensation to be paid to the various persons interested. The Arbitrator's award must be in conformity with the provisions of the second Schedule of the Act, and when published is subject to an appeal, as therein mentioned. It should also be noted that special provisions are made for assessing the compensation payable, and that no additional allowance is to be made for compulsory purchase. Consequently in all these cases the local authority will not be called upon to pay the customary 10 per cent.; and it has been decided that after the publication of the scheme no additional interests can be created, so as to increase the amount of compensation payable.

Another important point is that all easements and rights of light over the area are on the purchase by the Local Authority entirely extinguished, but compensation must be paid to the owners of such rights.

We may now assume that the Local Authority have obtained sanction to their scheme and acquired the land, and they may therefore proceed to demolish the insanitary dwellings and lay out the property. They may either do this themselves or sell the land, subject to the scheme being carried out by other persons. On large schemes an important point at once arises for consideration, namely, whether or not the surplus land, after laying out the streets, shall be disposed of by means of absolute sale or upon lease in suitable building plots?

In some cases it might be thought desirable to sell the property outright, either for a lump sum or subject to a perpetual yearly chief rent, with or without a premium. I believe that this course has been followed in Scotland, but no instance of the kind has come under my personal observation. The other course open to the Local Authority is to let the land on building lease for a definite term of years at a ground rent. In my experience this course is almost universally adopted. The form of lease must be very carefully prepared, so that the Local Authority will have full power over the character and quality of the building to be erected. It is generally found desirable to prohibit sky signs and unsightly advertisements, and to prevent the acquisition of rights of light as against adjoining owners.

I will now give one or two practical illustrations of the working of Improvement Schemes. As I have mentioned, the Artizans' and Labourers' Dwellings Act of 1875 provides somewhat similar machinery to Part I. of the Housing of the Working Classes Act, 1890, and on the passing of the former Act the Corporations of Swansea and Birmingham were not

slow to avail themselves of its provisions. It has been my good fortune to have the actual management at different times of the Schemes made by each of these towns.

In Swansea there existed in 1876 an area in the centre of the town covered with squalid and dilapidated courts and tenements, and harbouring thieves and criminals of every kind. Moreover, the average death-rate within that area was estimated at 40 per 1000. The area comprised 14 acres. The Corporation subsequently devoted three acres to streets. The usual stipulation was made by the Local Government Board for the housing of the population disturbed, but it was contended by the Corporation that local enterprise was sufficient in the undeveloped portions of the Borough to provide for these persons, and this stipulation was accordingly modified. The salvages, or surplus land after formation of streets, were relieved from the embargo of being used only for the purpose of re-erecting artizans' dwellings, and the Corporation proceeded to let them on building lease. The cost of acquiring the property on the Swansea area was estimated at £79,166, and the estimated value of salvages (surplus lands) and houses not taken down was £67,078. Deducted from this was the Corporation interest in property to be taken in the Greenhill district, namely, £1,044, leaving an estimated permanent charge to the Borough of £11,044. But this estimate was very much exceeded, the actual amount borrowed for the purpose being £120,000, and although the waiving of the provisions for re-erecting dwellings helped materially the future development, financially a very heavy charge remained. Nevertheless, an undesirable colony has been removed from the centre of the town, a marked improvement made upon the death-rate of that particular area, the rateable value has been increased, and a continual source of complaint both as to health and crime absolutely abolished.

In Birmingham the area dealt with was forty-five acres, about nine acres of which were used for new streets.

The representation described the insanitary condition of the district, the crowded and dilapidated state of the buildings and a high death-rate existing in St. Mary's Ward (namely, 26·82 per 1,000, as compared with 13·11 per 1,000 in Edgbaston Ward) and suggested measures for remedying the evils described.

Upon obtaining possession of the necessary properties, operations were commenced without loss of time for forming the proposed new streets. Corporation Street, the principal thoroughfare, was commenced in August, 1878, and completed for traffic early in 1882. The width of the street, after much discussion, was fixed at 66 feet, of which each footpath absorbs

14 feet. The length of the portion now opened is 851 yards. The length of the section still to be made is 633 yards, making a total length of 1,484 yards.

Several other new streets have been constructed and others materially widened.

During the progress of the scheme it was found necessary to obtain modification orders varying the powers originally given, but no unnecessary difficulties were raised by the confirming authority.

For the accommodation of persons of the labouring classes displaced by the scheme, an outlying area lying between Newtown Row and Summer Lane was acquired, and upon this site 62 workmen's houses and 20 retail shops have been erected by lessees of the Corporation. Upon the land in the area set apart for the erection of similar dwellings, 22 houses have been erected by the Corporation.

The total quantity of land purchased by the Corporation is 218,099 square yards, or about 45 acres. This area has, so far, been dealt with as follows:—

	Sq. yds.
Let on building lease	57,872
Sold or exchanged	17,393
Site of Victoria Courts	5,600
Site of Artizans' Dwellings in Ryder Street	9,166
Required for new streets and widening old ones	40,526
Still occupied by rent producing property	76,975
Cleared for letting...	10,567
	218,099

About 1,867 houses and 814 other buildings have been acquired, and of these 1,002 houses and 427 other buildings have been taken down.

Fifty-seven licensed premises were included in the above, and up to the present time 23 have been abandoned, the remainder being still in existence or transferred to new buildings erected upon the area.

The Town Clerk of Birmingham (Mr. Orford Smith) in a paper read to the Royal Statistical Society on the financial aspect of the scheme says:—

"The dwelling house improvement fund, created under the Artizans' and Labourers' Dwellings Act and Order, has been a great cost to the Corporation, but the results have amply justified the expenditure."

The Dwelling House Improvement Account at 31st March, 1898, was as follows:—

	£	s.	d.
Net expenditure on general capital account	1,551,137	0	6
Net expenditure on Artizans' Dwellings	18,000	0	0
Deficiency on revenue account, accumulated during the years 1880-92, now capitalised ...	117,011	7	10
Total net expenditure on capital account	£1,686,148	8	4

The money required for the scheme was borrowed for a term of sixty years, with the exception of the £18,000 expended on the erection of the artizans' dwellings, which was borrowed partly for forty and partly for fifty years.

An amount is provided from income each year for the repayment of these loans, sufficient to repay the whole within the periods for which they have been borrowed. The amount set aside for this purpose last year was £15,523 and the total amount so provided since the commencement of the scheme is £221,977, this sum deducted from the net capital expenditure as above, leaves the present liability in respect of the undertaking at £1,464,171.

In return for this large expenditure, the Corporation are now in possession of an income from well secured ground rents amounting to about £41,000 per annum, which will be further increased during the next four years (without any new lettings) to about £43,000 per annum, but from this figure must be deducted a rent charge of £3,000 payable in respect of property acquired from the trustees of the King Edward VI. Grammar School, leaving the net income from ground rents at £40,000 per annum.

A rental of about £18,500 per annum is also being derived from the shops, houses, and other buildings still standing on the improvement area, and after deducting £4,000 from this item in respect of rates, repairs, and other outgoings, a net income is available from this source of about £14,500 per annum.

There is still some uncleared land unlet in and near Corporation Street, which is at present producing no rental, but it is estimated that this will bring in sooner or later a further income of about £1,000 per annum. On the other hand, interest on loans, sinking fund charges and management expenses entail a total outgoing of about £69,000 per annum, which is £16,500 in excess of the present income, viz.:—

	£	£	£
Interest and other charges			69,000
Ground Rents	41,000		
Less Grammar School rent charges	3,000		
		38,000	
Rent of premises	18,500		
Less outgoings	4,000		
		14,500	
			52,500
Deficiency			£16,500

This deficiency has to be provided from the rates, and since the scheme was initiated in 1876, sums varying from £460 in 1876 to £25,000 in 1891, and £17,000 in 1898-9, and making a total up to the present time of £234,607, have been provided by the ratepayers.

The annual contributions from the rates will continue to be reduced every year until the loans are paid off, about 44 years hence. The undertaking will then be free of charge, and the whole of the net rental income of say £53,000 per annum can be carried to the credit of the funds of the City.

Speaking of this income the Town Clerk says:—

"This income will be further increased some fifteen years later by the expiration of the leases which are for seventy-five years, and the consequent reversion to the Corporation of the valuable land with the costly buildings which have been erected thereon in Corporation Street and the adjoining thoroughfares. It is difficult to form even an approximate estimate so far ahead of what this increase will amount to, but if no great change takes place in the value of property in the City during the interval it may be safely assumed that the Corporation will then be in possession of a clear income of over £100,000 per annum from the scheme."

From calculations made by the Town Clerk it appears that if the £100,000 per annum, the ultimate estimated rental, were capitalised at 3 per cent., and the necessary deduction made for the difference in date at which the full benefit accrues, the result would be about £3,000,000, or about the same sum as the contributions from the rates would realise at 3 per cent. compound interest.

Mr. Smith says, "The scheme will have in fact formed a kind of savings bank for the benefit of posterity, while the sacrifice made by the present ratepayers has had its reward in the street improvements, increased rateable value, vastly improved sanitary condition of the area, involving a greatly

decreased death rate, and the impetus that has been given by the construction of the new streets to the trade of the city, and the general circulation of money occasioned by the improvements."

The Town Clerk's paper to which I have alluded was read to the Royal Statistical Society in 1895, and I would refer to it anyone interested in the subject for further information as to the financial aspect of the Birmingham Scheme. I have taken large extracts from the paper and have to acknowledge my indebtedness to Mr. Smith.

As before mentioned the Corporation have themselves erected workmen's dwellings upon the area acquired.

They would gladly have allowed private persons to provide suitable dwellings for the working class on the cleared ground, but with the exception of the land on which the sixty-two houses mentioned above were erected, none was let for the purpose. It was consequently proposed by the Improvement Committee that the Corporation should sanction the expenditure of £5,250 on the erection of a block of model dwellings on the flat system, but this proposal was not accepted. Some time afterwards the Council sanctioned the erection of twenty-two through cottages before mentioned at an estimated cost of £4,000. These dwellings were at once let to respectable tenants at 5s. 6d. per week. The applications were largely in excess of the number of houses. I annex a plan of these houses (page 17, Plan A).

Encouraged by the first experiment, the Corporation afterwards embarked in the erection of eighty-one additional artizans' dwellings at a cost of about £14,000. These houses are similar to those previously built, their accommodation consisting of a front living room 13 ft. by 12 ft. 6 in.; front bed room, first floor, 13 ft. by 12 ft. 6 in.; kitchen or scullery 11 ft. 6 in. by 9 ft. 4 in.; back bed room 12 ft. 6 in. by 9 ft. 4 in.; with landing taken out and attic 13 ft. 3 in. by 12 ft. 6 in.; a separate w.c. being provided for each family. There is an asphalted or concreted yard common to each block, and wash-houses in proportion to the number of dwellings. These houses are let at rents 5s., 5s. 6d., 6s. per week and produce a net income of £790 per annum, which after providing for the interest and sinking fund, is sufficient to pay an average ground rent, spread over seventy-five years, of 10d. per square yard per annum.

As I have already mentioned, the Local Government Board always insist on the erection of dwellings for the working classes on the area acquired.

It may be interesting to give a few particulars of the different kinds of dwellings that have come under my notice.

The dwellings erected by the Birmingham Corporation in Ryder Street I have already described.

In Dublin the Corporation erected five-storey flats, dual houses, and one-storey cottages.

In Liverpool, five and six-storey flats, and in Manchester the same course was followed; but in each of these cities huge flats have been abandoned and the dual houses are now in favour. In London the flat system by reason of the scarcity of land seems imperative.

Under the Act of 1890 the Birmingham Corporation have formulated a small scheme for the removal of an insanitary area in Milk Street, the site being very near to the centre of the town. The acquisition of the land and of the buildings necessitated an expenditure of about £6,000.

Under the Provisional Order the Corporation are required to house 170 persons of the working classes, and for this purpose the City Council have recently adopted plans prepared by my successor, Mr. Tart, on the dual house principle in accordance with the diagram on page 17, Plan B.

The plans now await the sanction of the Local Government Board.

The tenements are arranged in four terraces and comprise twenty-four houses each containing one living room and one bedroom and 37 containing more than one bedroom.

The rooms average:—

Living room	13 ft. 4 in. by 14 ft.
Bedroom	8 ft. 2 in. by 14 ft.
Bedroom	9 ft. by 9 ft.

The small bedroom is designed for children only.

The rents have been fixed at 1s. 6d. per week per room, that is 3s. and 4s. 6d. per dwelling. Each tenement will be provided with a separate w.c., scullery accommodation and ash receptacle.

It will be noticed that the upper storey is approached from a balcony and this design permits each door and window to have the maximum sunlight and air.

The financial aspect of the Milk Street scheme is as follows:

	£	s.	d.
Estimated cost of building, including paving, &c., is	8,975	0	0
Road-making	146	0	0
Contingencies	897	0	0
Land at 5s. per yard (4,030 yards) ...	1,007	0	0
	£11,025	0	0

The estimated annual statement will be :—

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Interest and sinking fund on £11,025 ...	441	0	0	Estimated rental	659	2	0
				Outgoings ...	219	14	0
	£441	0	0		£439	8	0

The Improvement Committee in their report to the Council state that :—

"The cost of the Milk Street site was £6,000. Deducting the £1,007 charged to the houses from this sum leaves £4,993 to be provided for. The interest and sinking fund will amount to £199, and this annual payment from the rates must be considered as the City's payment for the sanitary improvement thus made."

As municipal representatives are aware, the housing of the working classes is a most difficult problem, and any scheme which is formulated receives considerable opposition. It is difficult to provide for a population of so diverse a character as the working classes. What I may term the respectable element is hampered and weighed down by a number of thriftless and unclean people who abuse any provision which is made for them. Possibly, this difficulty may be removed in the future by universal education, but I am afraid that many years will elapse before the dwellings which municipalities so liberally provide will be appreciated and used to the best advantage.

As my time is limited, I must conclude this part of the subject and add one word or two with reference to the second and third parts of the Act.

Part 2 of the Act is utilised at present by local authorities for the purpose of closing isolated houses or groups of houses which are unfit for habitation, because their condition is dangerous or injurious to health.

I am afraid that the operations of authorities are frequently hindered by the reluctance which magistrates sometimes exhibit in making the necessary orders. In many instances the justices appear to disregard the evidence of medical men and surveyors skilled in the subject; and as the authorities have no power to appeal against the magistrate's decision, a great many insanitary dwellings continue to exist. There can be no doubt that this is one of the greatest blots on the Act, and until it is removed no lasting and permanent benefit can ensue. The subject of appeal has, I believe, been discussed by the Municipal Corporations Association at the instance of the Nottingham Corporation, and I sincerely trust that some result may follow their deliberations.

This part of the Act also provides machinery to enable local authorities to purchase houses, in order to open up alleys and courts. If a medical officer finds that any building, although not in itself unfit for human habitation, is so situate that by reason of its proximity to, or contact with, any other buildings it stops ventilation, or conduces to other buildings being unfit for habitation, or if it prevents proper measures being carried out to remedy a nuisance which is injurious to health, he may represent such first-mentioned building as an obstructive building, whereupon the local authority may take steps to secure its removal.

It is worthy of note that the local authority will only have to pay compensation for the actual space taken, and will not be obliged to buy the whole of the owner's land, but will only bear the cost of the severance.

Under the third part of the Act, the Local Authority is empowered to provide lodging houses or cottages for the working classes. Several municipalities have acted under this part of the Act, viz. :—Manchester, Southampton, Glasgow, &c. It is, however, beyond the scope of this paper to discuss the character of the buildings provided.

In conclusion, I can only add that it is a matter of deep regret that many of the houses inhabited by the working class are not in the state of repair they should be, and that infectious diseases claim the majority of their victims from these houses. A wide field is offered in most towns for the application of both parts one and two of the Act; for there is no doubt that as the landlords execute as few repairs as possible, the decay of the property increases year by year, and the classes of tenants thereby degenerate. If the Local Authority do not step in, area after area becomes insanitary. In many of our large towns there exist courts and alleys without number where perpetrators of crime and vice congregate. It is to be earnestly hoped that Municipal Representatives will study closely the provision of the housing of the Working Classes Act, so that these plague spots may be abolished, light and air admitted, and the lives of the working men rendered brighter and happier.

"*Municipal Authorities and Public Slaughter-houses*," *by* E. Parkes, M.P., Chairman of the Birmingham Markets and Fairs Committee.

The importance of the question to Municipalities of the establishment of public slaughter-houses is not appreciated as it should be in this country, and it is only recently that we are giving that consideration to the subject which it deserves. Other countries, especially Germany, have gone a long way ahead of us, and it behoves those who have the health of the public largely in their hands to pay increased attention, not only to the sanitary question as to how a private slaughter-house affects the health of the inhabitants of the neighbourhood in which it is located, but to the securing of a large and wholesome food supply for the people, and to ensure that animals are prepared for food under sanitary conditions, and with efficient supervision by meat inspectors. We are slow to move in this country, but having once grasped the importance of the subject we shall hope to make up for lost time.

It is a large question, and it is impossible for me to go into much detail with the time at my disposal.

There are four main divisions to consider.

1. The establishment of public slaughter-houses or halls with all modern appliances, and with the sanitary arrangements as perfect as possible.
2. The efficient inspection of meat by qualified persons.
3. Proper facilities for keeping dead meat.
4. Mode of killing.

On the first point there is no doubt that the existence of so many private slaughter-houses often in a very insanitary condition, and placed in the midst of a dense population is one of the greatest drawbacks we have in England in dealing with the whole subject. Our parliamentary powers are insufficient to deal with them. In the case of new communities and new areas in this country, no doubt it can be and is being dealt with, but in our large towns, vested interests are so sacred and the number of registered and licensed slaughter-houses so numerous that it presents an almost impassable barrier to those who desire to see things altered for the better. In Germany again it is quite different, there the public powers are

amply sufficient to deal with any nuisance arising from private slaughter-houses, it is no uncommon thing to find in the large towns that powers are exercised in abolishing private slaughter-houses, and erected in their place fine new establishments, in a suitable position, outside the town, with good railway accommodation, and comprising market-halls for cattle, sheep and pigs, slaughter-halls, refrigerators, laboratories, destructors, refreshment rooms, offices, and all appliances necessary for a complete market.

In Germany the Town Council where the General Slaughtering Act has been applied by means of a local Act, has power to erect and carry on public slaughter-houses.

The Town Council may issue an order prohibiting the slaughtering of animals anywhere within the limits of their district, except at the public slaughter-houses.

The prohibition may also be applied to the carrying on of all trades intimately connected with the slaughter of animals for food.

The Council may prohibit a further use of private or other slaughter-houses, except those erected or carried on by an association or guild of butchers.

The Council may, after they have erected public slaughter-houses, make regulations to the following effect:—

For the examination by experts, both before and after slaughter, of all animals brought to the public slaughter-houses, in order that the condition of such animals may be ascertained.

For the examination of all fresh meat not slaughtered in the public slaughter-houses, by duly appointed experts, before it is offered to the public for sale. A fee shall be payable by the owner of the meat to the Council for such inspection.

That fresh meat brought from outside the area of the town, and disposed of to restaurants, hotels, &c., shall not be prepared for food until it has been inspected.

They may altogether prohibit the importation of prepared meats.

That in public markets, shops, &c., the flesh of animals which have not been slaughtered in the public slaughter-houses, shall be kept, and exposed for sale, separate from that which has been so slaughtered.

The Council may order that no meat shall be sold in any public market hall, which has not been slaughtered, &c., at the public slaughter-house.

That butchers shall not offer meat for sale which has been slaughtered outside the area, and within a prohibited district or radius.

The Council may make and publish regulations as to the

examination of meat, and fix the fees to be taken for such examination.

Regulations as to the inspection of meat not slaughtered in the public slaughter-houses, shall direct that all meat shall be submitted to the Inspector—in the case of large animals, in sides or quarters, and in the case of small animals, in whole carcases.

The fees to be charged for the inspection of meat shall not in the aggregate exceed the cost of such inspection. Various lines and restrictions are laid down as to how, and under what circumstances, these regulations are to be carried into effect.

The regulations of a local authority require the approval of the Provincial Government.

The Town Council may close all private slaughter-houses after giving six months' notice of their intention so to do. It is within their discretion to allow a longer period to elapse. After the issue of such notice, it is illegal to erect any new private slaughter-houses.

Compensation shall be paid by the Council to the proprietors and tenants of the private slaughter-houses which are closed in pursuance of the Council's orders, such compensation being for real damage or loss which can be proved, by the aforementioned persons, on account of the closing of their places, such places having been built for slaughtering purposes.

In calculating the compensation to be paid, the amount which may be realised from the properties and fixtures when used for other purposes, shall be deducted.

No compensation shall be paid for the extra trouble there may be involved, by reason of a butcher having to slaughter away from his own place of business.

Where the premises to be closed are held by the occupier on a lease, such lease shall terminate at the same time as the notice issued by the Council.

No claim shall stand as between landlord and tenant on account of such termination of a lease.

It is necessary for the owners and tenants of premises to be closed, to give notice to the Provincial Government of their intention to claim compensation, within six months, or their claims will not be allowed.

This Government appoints an arbitrator, who, with the assistance of two others, one to be appointed by the claimant and one by the Town Council, shall inquire into the claim that has been made. The above is a short description of German Law on the question of inspection and private slaughter-houses.

The Royal Commission on tuberculosis in their Report to our Parliament this year recommend.

(*a*) When the local authority in any town or urban district in England and Wales and Ireland, have provided a public slaughter-house, powers be conferred on them to declare that no other place within the town or borough shall be used for slaughtering, except that a period of three years be allowed to owners of existing private slaughter-houses to apply their premises to other purposes.

(*b*) That local authorities be empowered to refuse all meat slaughtered elsewhere than in a public slaughter-house and brought into the district for sale, to be taken to a place where such meat may be inspected, and that the authorities be empowered to make a charge to cover the costs of such inspection.

(*c*) Inspectors shall be engaged and shall stamp the joints of all carcasses passed as sound.

4. The Commission further recommends that it shall not be lawful to offer for sale the meat of any animal which has not been killed in a duly licensed slaughter-house.

These are drastic recommendations, but it is what other countries have had to do and we shall be compelled to do likewise if we are to deal effectively with the question. It is worthy of the notice of other municipalities that the Public Health Committee of the London County Council are recommending the Council to inform the Local Government Board that they are prepared to carry out the recommendations of the Commission if the power be given to them by Parliament.

In Germany on the closing of private slaughter-houses compensation is paid to the owner and tenant, a definite procedure for ascertaining the amount being laid down by Act of Parliament. In Leipzig the prohibition of all private slaughter-houses and the provision that all slaughtering shall be done only in the public slaughter-houses is very stringent.

Equally important with having a suitable public slaughter-house, is the question of efficient inspection of meat. This is conducted in a most scientific manner in Germany, and from all we learnt is most successful. So thorough especially is the microscopical examination of pork, that one of the members of our deputation which visited Germany was led to remark, "Well, after seeing the way they examine pork in Germany, I should have no hesitation in eating German sausages."

In England there is no compulsion to have meat inspected at all. It is left to the conscience of the butcher if he has any doubt about the quality to call in the inspector, or to the perseverance and sharp eyes of that official to discover cases of inferior meat offered for public sale. In Germany it is compulsory that all meat should be inspected and stamped before it is

used for the food of man. Our inspectors may be very vigilant, but in consequence of the large number of private slaughter-houses it is impossible for them to visit them all when the process of killing is going on.

The question of stamping meat has recently come up for discussion in this country, and there seems a great amount of prejudice against it, but in Germany it is exactly the reverse. Many stamps are placed on each carcase, and these stamps are a guarantee of soundness and without them people there would hesitate to purchase.

In Leipzig all cattle brought into the market are examined by experts. The staff consists of a director, who is the supreme officer, and acts with the consent of the Minister of the Interior as official veterinary inspector for contagious diseases in cattle for a given area, and is responsible for all inspection. Besides the director there are the two veterinary surgeons, two assistant veterinary surgeons, the chief of the microscopical department, and microscopical assistants, and the officers engaged in taking the samples of meat. The chief officers are sworn in by taking the oath, and bind themselves to truly and conscientiously execute the work of meat inspection, to carefully watch the slaughtering of all animals by slaughtermen, and to observe the ordinary bye-laws.

Attached to all the large markets is a staff of veterinary and microscopical inspectors. In Berlin, for instance, we were told that there were two hundred and forty persons engaged in the microscopic examination of meat, ninety of whom were women.

There is no doubt that we are very much behindhand on the question of meat inspection in England, and without attempting to go into it as thoroughly as described above, there is a great deal that we might and ought to do to make inspection more thorough. A veterinary surgeon with a practical training is the ideal inspector, and the time is coming, no doubt, in this country, when some such a law will be enacted. The opinion of such men will be taken generally without any question by the butchers, but an unqualified or inexperienced man is often the cause of a great deal of friction and unpleasantness in carrying out his work. In some districts in England, especially in country districts, the system of inspection is most lax, and the inspectors have often the flimsiest qualification to perform their duties.

The whole question requires to be put on a different basis, and not left, as it often now is, to men with a mere smattering of knowledge, and who have been able to answer a few questions at a sanitary science examination.

There should be more uniformity of practise, the recommendation of the Royal Commission being very useful in this respect, and officers of different localities should work together so that it would not be possible, as it sometimes is now, for dealers in bad meat to be driven out of a district or town where inspection is efficient, and establish themselves over the border where inspection may be very lax.

The whole question of meat inspection and public and private slaughter-houses, requires the immediate attention of municipalities and of the legislature, with a due consideration, not only for the public health, but also for the interests of the traders concerned.

I think it is well that I should give some idea of the magnitude of the German establishments. In Berlin, with a population of 1,700,000, the general slaughtering law was applied in 1883, and that same year the markets in that city were opened for use at a cost of £600,000, immediately after that date all private slaughter-houses in the city were closed. The cattle markets and slaughter-houses are in the outskirts of the city, and cover an area of 90 acres, 28 acres of which is reserved for railway sidings, including land for their extension. The cattle market hall is a huge building 240 yards × 80 yards wide, or about 4 acres in area.

Hanover, population 126,000. Cost of markets £140,000, situated about 1½ miles from the centre of the city; area of site about 17 acres.

Leipzig, population 330,000. Cattle markets and slaughter-houses nearly two miles from the centre of the city. Area twenty-nine acres. Main line of railway running at side of markets. Tramway also into the markets. Total cost including land and railway siding £235,000. These markets erected in 1888, and are among the most complete of any in Germany.

Spandau, population 35,000. Area of markets nearly four acres. Cost of building £40,000.

The markets in Germany generally include market-halls for live cattle, sheep, and pigs; slaughter-halls for the different animals, including one for horse slaughtering; cold storage; bad meat destructors; ice making plant; rooms for tripe dressing; fat and tallow departments; and last but not least the inspection departments. We generally noticed the scrupulous cleanliness and order which prevailed in these establishments, and everywhere they were laid out on a large scale with plenty of room for each department. This is only possible where land is taken outside the city, and from what we saw it is certainly the best way of dealing with the problem, but in Germany they have Parliamentary powers to enable them to carry out their

ideal, and they seem to have unlimited money to spend in the building of their markets. In Germany the whole question has been grasped boldly, thoroughly, and successfully.

On the question of killing it is not necessary that I should say much. We found that generally in Germany the pole-axe was used as with us, in the case of beasts a mask was sometimes put over the face of the animal. In the slaughter of pigs a small cylinder enclosing a pin and controlled by a spring was used, a large wooden mallet being used to strike the pin when placed on the animal's head, which is really a spring pole-axe. We have tried several new methods of slaughtering animals, but generally there are drawbacks to the use of each of them and in the hands of a duly qualified slaughterman the pole-axe is as sure and expeditious as any other method.

In Birmingham a few years ago we were confronted with the problem of building new Market Halls, slaughter-houses, &c., and after visiting many Continental and English markets, and giving the matter a great deal of thought, we decided upon the erection of the present buildings which have now been opened about nine months. The plans adopted were those prepared by Messrs. Essex, Nicol & Goodman, of Birmingham, who acted as the architects in carrying out the works. It is not exactly ideal inasmuch as it is placed in the centre of the town, but we had no alternative, the land having been purchased some years ago.

We had about 12,000 yards of land to deal with, and our business was to make the best use of it.

On the ground floor we have placed the large meat market, twenty separate slaughter-houses for wholesale butchers, the slaughter-halls, the offices, the fat stores, &c.

On the upper floor we have placed the lairage for cattle and sheep and the tripe-dressing departments, blood and gut-cleaning departments.

In the basement we have the cold storage, the engines for electric lighting and for cold storage, &c., and steam boilers.

The main hall is 365 feet long by 95 feet wide by 65 feet high to centre of roof. Over the stalls, in the centre of market, are thirty-four offices, approached by two staircases, for the use of the salesmen. We have two hydraulic lifts connecting the market-hall with the cold stores below; the meat market-hall is fitted to hang about 3,000 sides of beef. We have a complete system of overhead travelling gear connecting the slaughter-houses and halls with general market and cold stores.

We have a very complete electric lighting system, the motive power being supplied by four large gas engines of 85 brake horse-power each, running 200 revolutions per minute.

Hot water and steam is conveyed to the different depart-

ments all over the site, there being hot and cold water taps in all the slaughter-house departments.

We have a tripery fitted with all necessary appliances, rooms for fat and hides, ropes, blood, &c.

We have also, in addition to separate slaughter-houses, a slaughter-hall for beasts, sheep and calves 250 feet long by 40 feet broad. In Germany, as already explained, the system is to slaughter in open halls, they like it best for many reasons and perhaps it is the best system on the whole. We could not very well adopt this system in its entirety, there was some feeling against it by the trade, but have adopted the two systems but ere long I expect that the slaughter-halls will be extensively used.

The pig slaughter-hall is 96 feet by 40 feet, and is fitted with six scalding tubs.

The cold stores and chill rooms have been constructed by the Linde Refrigeration Co., who have leased a portion of basement from the Corporation and have constructed rooms which will store about 25,000 carcases of mutton and 300 sides of beef.

Accommodation is being provided for the slaughtermen in the shape of a mess-room, another room being allotted for the salesmen. The Birmingham Coffee House Company have a shop on the premises.

A water tower is erected on the Bradford Street end of the site in which are placed two large tanks, containing a reserve of water about 20,000 gallons in case of a temporary shutting-off of the mains.

The action of the corporation in erecting these premises has been fully justified, seeing that although the area of the meat market-hall is six times that of the old market nearly every stall is let. Nineteen out of the twenty separate slaughter-houses are let, and killing is now being carried on in the slaughter-halls.

The total cost of the scheme, including the site, which was an expensive one, will be about £120,000.

Birmingham justly feels that in regard to its meat market and public slaughter-houses, it has premises which are constructed on the most modern principles, due regard having been paid to a good hot and cold water supply, efficient lighting and ventilation, drainage arranged to prevent the escape of solids into the sewers, the manure &c. being carted right out on to farms. The premises are capable of being properly cleansed, and it has been our endeavour to ensure that the surroundings of the fresh killed meat shall be pure and clean, and that as little handling of the meat as possible shall take place.

Although our new market hall is six times the area of the old one we find it none too large, nearly every stall at the present time being let.

Since the premises have been erected many other municipalities who are moving in this matter have sent deputations to inspect the premises and arrangements here, and the Markets and Fairs Committee will be pleased at all times to arrange for such inspections and to give any useful information which they can on the matter.

"*The Cleansing of Persons Act, 1897, 60 & 61 Vict., Ch. 31,*" *by* A. WYNTER BLYTH, Medical Officer of Health, Marylebone.

(FELLOW.)

THIS Act in its early stage was introduced under the title of "The Verminous Persons Bill." It gives local authorities the power to expend any reasonable sum on buildings, appliances, and attendants that may be required for the purpose of cleansing persons infected with vermin, and the use of the apparatus is not to be considered parochial relief. In the definition as to the meaning of "*Local Authority,*" a distinction is drawn between England and the County of London, the words are, "In this Act 'Local Authority' means in England the Council of any County Borough, the District Council of any district, any Board of Guardians, *and in the County of London any Sanitary Authority as defined in the Public Health (London) Act 1891.*" It therefore seems to me that London Boards of Guardians have not been invested with the duties or powers under the Act. I submit that the words "any Board of Guardians" means any Board of Guardians in England other than in London. This opinion does not however appear to be held by several of the Clerks of the Metropolitan Boards, and as usual with modern legislation the section is not so clear as to admit of but one interpretation.

The author suggested to the Vestry of St. Marylebone the desirability of establishing a single bath in the grounds adjoining the shelter as an experiment. There was an impression that such a bath would only be rarely used. However dirty the denizens of lodging houses, Salvation shelters, and those who on warm nights sleep in the Parks, open spaces, and door-

ways; it was not anticipated that they would make use of soa and warm water, even if offered free. The results have however, proved conclusively that facilities for cleansing ar eagerly taken advantage of.

The present premises are entirely of a temporary nature Simply a small bath room containing two baths, the hot wate being supplied by a geyser; adjacent to, and leading out of th bath room is a waiting room heated by a stove. On an applican arriving, he strips, and his clothes are placed in a basket an conveyed to the steam disinfecting chamber. If the clothe are not disinfected by the time the bath is finished, a long sor of dressing gown is given him, and he sits in the ante roon which in winter or cool weather is warmed.

From the 2nd March to September 3rd, with this simpl primitive apparatus no less than 1,945 persons have bee cleansed, the largest number on one day being thirty-five.

Plans have been adopted by the Vestry for much enlargin the bath accomodation, and also providing baths for female A special disinfecting machine has been purchased, and Cornish boiler. In a few months it is hoped that thes improved arrangements will be in operation; but local oppo sition has sprung up on the ground that the existence of th "Cleansing of Persons Baths" deteriorates adjoining propert by attracting the tramp class to the locality; this oppositio may for a time delay the work.

The persons who have taken advantage of the baths are draw from the Salvation Army shelters, from lodging houses an generally from the tramp class. By far the majority of case were swarming with lice and were affected with skin diseases. A few poor creatures were found to be suffering from incontinenc of urine, and in default of proper appliances to minimise th inconveniences of such an affection, their clothes were in such state of ammoniacal saturation as to render them most offensiv In a fair percentage of cases men after being cleansed hav been able to get work on the Central railway, having bee refused work while they were in a dirty state.

The chief attraction of the Marylebone baths, is that at th same time the clothes are disinfected,—the cases that hav applied would have received but temporary relief from a simpl bath; the vermin on the skin would alone have been washe off, and the applicants in twenty-four hours would have bee in as bad a state as before. The St. Marylebone baths ar in theory confined to persons who have passed at least a nigh in the parish. There is, however, no means of ascertainin the truth of an applicant's statement, and as a fact no stric enquiries have been made, the result being that as St. Mary

lebone is, I believe, at present the only parish which possesses these appliances, we get more than our proper proportion of dirty people. A number of other Metropolitan districts are, however, now taking the matter up, and this unequal distribution will only be temporary.

The Act is at present permissive, a person who wants a bath must apply; however filthy a person may be, there exists no power to compulsorily cleanse him. It is my strong opinion that in the interests of the public, there should be a power to compel in certain cases a dirty person to have a bath. Take for example a case which occurred a few weeks back in a London Police Court. The defendant was reported to the Magistrate to be in such a filthy state as to be unfit even to be placed in the dock. Accordingly the Magistrate put on his hat and heard the case in the back yard attached to the Court. The legislation which I suggest would be something after the following. "Any person in a place of public resort in such a state of personal filth as to be a nuisance, may on the certificate of the Medical Officer of Health, be ordered by a Court of Summary Jurisdiction to be cleansed in any bath established under the Cleansing of Persons Act; and in case of refusal or resistance, it shall be lawful to forcibly compel such person to be cleansed."

"*Village Sewerage Schemes: Experiments in the Rural District of Brixworth*," *by* Rev. Dr. Cox, F.S.A., Chairman of Brixworth Rural District Council.

There is no Rural District in England, of at all similar area and population, that can compare for a moment with the Brixworth District in the large number of its sanitary experiments. It may be of profit to others to know of our attempts and our failures.

The Brixworth District consists of thirty-six district villages or hamlets, with an aggregate population of 12,000, and an area of 62,648 acres. Out of the total seventeen are sewered. The seventeen sewered villages have an approximate population of 3,000, and the nineteen unsewered of 4,000.

About 1873 the system of water-carried sewage was before

the sanitary authority. In that year the experiment of water-flushed sewers discharging into a small filtration bed was begun at Moulton, the largest village in the district. The second to be sewered was Brixworth, the next largest in population; this experiment was carried out in 1877, together with that of Walgrave. The two last villages to be sewered were Pitsford and Boughton; the works for both these villages were finished in 1895, but they were ordered by the old authority.

Since the Local Government Act of 1894, which provided for a popularly elected district council, attempts to extend sewerage schemes to other small villages have been successfully resisted. The resistance of the very large majority of the council has not been based upon economical considerations, but rather upon the belief that most of the previous experiments in this direction have been distinct failures.

It would be wearisome to trouble the members of this section with details as to each of our seventeen village schemes, but a table is appended on the opposite page giving every particular as to date, population, area of bed, subsoil, crops, effluent, and labour with regard to each.

The removal of refuse and excreta by water carriage, which is the ordinary sewerage method of towns, pre-supposes (if the method is to be successful), five conditions:—(1) a copious water supply; (2) properly laid sewers, with adequate fall; (3) a sufficiency of suitable land for irrigation or filtration purposes; (4) a large outlay; and (5) good and continuous management.

It is my contention that the many experiments of the Brixworth District, several of a quarter of a century duration, prove that it is practically impossible to find these conditions co-existent in rural districts or amid small village populations, and that the health of the village will not be permanently promoted by a water-carried system, but will rather in the long run materially suffer.

Evidence was laid before the Public Health Amendment Bill Committee in 1877 as to the sewering of several Brixworth Union villages, and the local nuisance inspector, when examined by Mr. Pell, stated that the system thoroughly answered. But at that time it was far too soon to draw any satisfactory conclusions.

How have the five conditions mentioned above as essential to success worked out in our rural district? Let us take them seriatim after a brief fashion.

(1) *A copious water supply.* Surely in village sanitation this provision should stand absolutely first. At the same time, it is possible to have too copious a water supply running into

Name of Parish.	Year of Sewering.	Loan from L.G.B.	Population (1891.)	Area of Filtration Bed.	Subsoil.	Crop.	Labour.	REMARKS. ["C. S." means County Surveyor's Report, Sept., 1897.]
Moulton	1873	£970	1382	1½ acres. 1 acre added '97.	Clay.	Osiers.	3/6 a week.	Bed near stream. Three years ago thoroughly rank, and effluent bad. An acre added last year. So far working well.
Scaldwell	1874	£270	276	None.	....	......	...	No bed. Sewage falls into ditch, and thence in almost crude state into brook.
Guilsborough	1874	...	553	None. 1 acre in 1891.	.... Clay.	...... Mangol.	... 2/6 a week.	Two outfalls to 1874 sewers—north-west and north-east. Sewers only old brick culverts, formerly highway drains; both emptied into fields. In 1889 farmer threatened injunction, alleging damage to cattle. Acre bed for north-west outfall 1891; effluent into long ditch, thence to stream. Effluent fair, but sewer fungus in ditch. New scheme for bed for north-east outfall now in hand. Recent serious outbreak of diphtheria.
Cold Ashby	1874	...	276	None.	....	......	...	Scheme now in hand for remedying grave nuisance of principal outfall. Sewer into which connections are made an old brick culvert, formerly highway drain.
Walgrave	1875	£660	563	½ acre. 1 acre added '96.	Stiff Clay. Clay.	Mangol.	2/6 a week.	For last seven years bed has been a thorough failure. Close to brook; effluent very foul. Bed flooded every storm. Sewers unventilated, partly old highway drains. Much illness, of blood-poisoning character.
Brixworth	1877	£800	1108	100 poles. ½ acre added '92	Mostly Clay.	Mangol.	3/6 a week.	Drains badly laid; no manholes. Connections direct into sewer. Leaky joints have contaminated wells. L. G. B. has just sanctioned £700 loan for re-laying sewers, and has ordered water supply from a distance, and enlargement of bed. Original bed, after fourteen years' use, "a mass of sewage." Effluent now bad Much typhoid in village last year.
Harleston	1879	£600	613	1½ acres.	....	Ash-poles and Osiers.	½ day a week.	Much spring water enters sewers. Rapid stream close to bed. Effluent poor.
Chapel Brampton	1880	£400	217	¾ acre.	....	Osiers.	½ day a week.	Earl Spencer first established costly waterworks at his own charge, and his Lordship is responsible for interest on loan. Sewering done by his own engineer. The privies are true water-closets. System excellent, save lacking in ventilation. Small catch-pits are used on beds, with alumino-ferric as a precipitant. Effluent fairly clear.
Spratton	1885	£850	794	1 acre.	Stiff Clay.	Mangol.	...	Bed has never worked well, save for brief periods, though various experiments have been tried. Injunction obtained in 1889 by farmer for fouling ditch and damaging cattle; costs paid by the Authority, £100. Effluent still bad. Recent diphtheria and scarlet fever in village. Now under management of Parish Council.
Ravensthorp	1891	£650	352	1 acre.	Clay.	Mangol.	2/6 a week.	Bed near stream; has worked well, but getting clogged. "Effluent into brook very foul." (C. S.)
Great Brington	1892	£700	742	60 poles.	Clay.	Osiers.	2/6 a week.	Bed getting sewage-sick; requires extending. Catch-tank emptied every three months. "Effluent into stream foul" (C.S.). Runs into ornamental water.
Little Brington	1892			60 poles.	Partly Gravel.	Osiers.	2/6 a week.	Bed getting sewage-sick; requires extending. Catch-tank emptied every three months. Effluent fairly good. Runs into ornamental water.
Pitsford	1895	£250	508	1 acre.	Good Loam.	Mangol	2/6 a week.	Pitsford was first sewered in 1891-2; sewage into ditch. Bed of 1895 so far working well. "Effluent into brook cloudy" (C. S.).
Boughton	1895	£500	293	1 acre.	Clay.	Mangol.	2/6 a week.	Close to the brook. So far working fairly well. "Effluent into brook fairly clear; more attention needed" (C. S.).
Holdenby	1878	£85	209	¼ acre.	Clay	Ash-poles.	...	Work done by the Authority very inefficiently. Typhoid in 1895, water contaminated; drains re-laid. Sewage runs into ash plantation; occasionally overflows into small stream.
Overstone	1878	...	[illegible]	....	....	......	...	Sewerage system put down by the Authority, but managed by Lord Wantage's Estate. Sewage runs into small stream, afterwards into ornamental water in the park.
Althorp	......	...	110	1 acre.	....	Osiers.	Every day.	Catch-tanks also provided. The daily supervision, and larger area, make this bed work well. Effluent into brook fair. Privately managed by Earl Spencer.

your sewers, if the village is in a district abounding in surface springs. This has been and still is the case with the village of Brixworth (sewered in 1877), where the amount of water that constantly gets into the sewers is sufficient (according to the estimate of our inspector) to cover the whole area of the filtration bed two inches deep once in every twenty-four hours. The result is disastrous; the effluent into the adjoining brook is never good and occasionally singularly foul.

Throughout our seventeen sewered villages, there is only one in which the question of the water supply was thought out and engineered before the sewerage scheme was begun, and it is the only one in which each closet is supplied with a cistern. Chapel Brampton is the solitary instance, with which I am acquainted, where a water-carried sewage system, as applied to a rural village, can be said to be a success. This village, with a population of 217, is on Earl Spencer's estate. The water supply and sewerage works were executed by Mr. Griffiths at his lordship's charges, and were for the date (1880) admirable of their kind, and even now produce fairly satisfactory results.* It is difficult, however, to imagine that any rural sanitary authority would have undertaken such a scheme, and it would have been almost more than any rates could possibly have borne. Here, and here only in our district, was the right principle followed, viz., the construction of a reservoir, fed by a wheel and pumped from a clear spring supply at some distance, before ever the sewers and the connected closets were constructed.

Nowhere, save at Chapel Brampton, out of our seventeen schemes, are the connected closets technically water-closets. They are simply closet-pans, and to keep them sweet, water has to be hand-carried and thrown down each day. The water in several of our sewered villages is at a considerable distance from many of the cottages. It is unreasonable to expect that the average cottage housewife, when she has fetched the water for varied domestic purposes, will care to regularly hand-flush the closet. The consequence is that many of the pans get coated with filth and choked up from time to time. To sewer a village without at first providing for the flushing of each pan, even if the flushing tanks of the main sewer are kept well supplied, is a curse instead of a blessing. The connections, often of considerable length, thus remain practically unflushed from year's end to year's end, and occasionally get fouled and choked

* This Chapel Brampton scheme was fully illustrated and described in Sir Henry Acland's treatise, *Health in the Village*, published in 1884.

I have seen several such connections opened which were in a very nasty condition.

(2) *Properly laid sewers with adequate fall.* To secure a good fall to the filtration beds, in an undulating district like ours, the risk is incurred of selecting a bed close to the brook or stream in that valley. This has been done by us at Walgrave, where the bed almost touches the brook, and is in consequence subject to an overflow during heavy rains, with disastrous results. A like mistake was made at Moulton and at Harleston. The very last scheme at Boughton (1895) is also on the verge of the stream. At Brixworth the fall of the sewers was not sufficient, and there and elsewhere they were not laid straight. Awkward angles sometimes occurred, whilst manholes and ventilation shafts were unknown in the earlier examples which were held up to admiration in 1878. In the earlier examples, and in some of later date, the sewer drain pipes were unsocketted, and the joints were merely made with the clay. In two cases, namely, at Guilsborough (a large village) and at Cold Ashby, the main sewers are simply uncemented culverts. Into these, closet connections have been made, and is it to be wondered at that Guilsborough has at the present time failed to purge itself of diphtheria, which has been constantly recurring during the past twelvemonth.

The grievous thing about a badly laid system in a country village is the great difficulty in persuading the local authority to incur the necessary expense of altering or improving the scheme. The initial expense is brought up against the reformer, and often nothing but a serious epidemic will rouse the parish and the authority to enter upon remedial measures.

(3) *A sufficiency of suitable land for irrigation or filtration purposes.*—When the Local Government Board sanctioned the earlier of the Brixworth District schemes, their ideas as to the quantity of land required for effective natural filtration were very meagre, and remained so for some time. Moulton, with a population of 1,400, had $1\frac{1}{2}$ acres; Brixworth with 1,100, one acre; and Walgrave with 600, half-an-acre. Even Pitsford, so late as 1894, with a population of 500, was only required to have half-an-acre. The consequence of this is, that, although working fairly smoothly for two or three years, the land becomes sewage-sick (or clogged with more or less solid organic matter), and a variety of expedients have to be tried to freshen it. At last another small bit of land has to be added; but this is after all only a temporary expedient, for the old evils will be reproduced after the lapse of another year or two.

Our beds are for the most part planted with mangel-worzels, but one or two grow osiers, and another ash-poles.

In several cases the beds are of stiff clay—here the question of natural filtration (whatever the size) is altogether hopeless. Spratton is one of the worst of our examples of this kind. A satisfactory effluent has never been obtained there, save for very brief periods, and at times the discharge into the small adjacent stream has been very bad. The foulness of the effluent led some few years ago to legal proceedings against the old authority, when an injunction was obtained.

It will be remembered that at last year's congress at Leeds, Dr. Barwise said that for drainage on to clay an acre of land would only suffice for 25 people. At this rate the Spratton bed ought to have an area of 37 acres, instead of consisting, as at present, of a single acre. In short, where there is a clay subsoil, any proposal to entrust to it sewage, without the use of tanks, is rank folly, and doomed ere long to certain failure.

(4) *A large outlay.*—Sir Henry Acland laid this down as an axiom of successful water-carried sewering some fifteen years ago, and year after year yields proof of its absolute truth. This is one of the chief reasons against such a system for small rural populations. The large populations and the successful commercial undertakings of our towns, together with the obviously stern necessity of having a reservoired water-supply and some kind of sewage scheme, make such matters comparatively easy to carry out on a satisfactory scale in boroughs. But agricultural depression, dwindling population, and common sense opposition make it exceedingly difficult to carry out a thorough and therefore an expensive scheme in the country. One inspector tells me that several of our more recent instances of village sewering were rendered far less effective by the cutting down of the original estimates.

(5) *Good and continuous management.*—This was laid down by Mr. Roechling, at the Newcastle Congress, as one of the two absolute necessities for successful sewage farming, whether big or small, the other being a good soil. Without considerable annual outlay, this good management cannot be attained in villages; and yet the rates seem scarcely able to bear it, and the proper control of a sewage system and its disposal bed is almost unknown. At all events continuous management does not exist in the Brixworth district. I cannot at this point do better than quote the words of our inspector in a recent communication to me: "To get a good effluent even from the best made bed on the best soil, there must be good management. When a man is not constantly employed, he should at least attend to the turning of the sewage twice a day. Many parishes pay a man to turn the sewage only 2/6 a week, and the man has to walk a mile or more to and from the bed.

Neglect of management is one of the main causes of beds going wrong."

So late as May 9th, 1889, it was resolved by the Authority, on the motion of Mr. Albert Pell, to employ a man *one day each week* on the Brixworth and Spratton filtration grounds!

With regard to River Pollution, our filtration beds are serious and continuous offenders, as will be seen in detail from the table (page 35). They have recently been severely condemned by the Surveyor of the County Council. Comparatively small attention has hitherto been given to river pollution from beds so small as ours; the gravity of dealing with town effluents has been sufficient, but now that the County Council has appointed so distinguished a Medical Officer of Health as Mr. C. E. Paget, further steps will probably be taken. The results to rivers from the foul effluents of small villages should not be disregarded, for it would be easy to work out a calculation which would prove that—if only the other rural districts of Northamptonshire had followed the lead of Brixworth in 1873, after a like ration and with like methods—the River Nene would long ago have become one continuous stinking open sewer!

With regard to the equally grave question of the effect on the health of the district itself from these numerous village sewer schemes, it is impossible to give full or accurate statistics. For the old Authority was so enamoured of these schemes, that other sanitary precautions were absolutely eschewed. Brixworth was the only Rural Sanitary Authority in England that persistently defied the Local Government Board and the Public Health Act of 1875, by having no Medical Officer of Health to make periodical visits and reports. This reproach was only removed last year. Brixworth, too, under the old regime, refused to adopt the Notification of Disease Act; this reproach, after four defeats, was only removed last month. Still there is no doubt whatever that, broadly speaking, the health of our unsewered villages is better than those that are sewered; and this I have deliberately stated before a Local Government Inspector at a public inquiry.

Under all the circumstances detailed in this paper, it is grievous to have to state that the Local Government Board refuse us leave, when wanting to improve the foul effluent at Brixworth and Walgrave, to try precipitating tanks, unless we add to the acreage of beds that have already failed. Whereas, if the tanks succeeded as well as elsewhere, no land would be required. The central authorities seem blindly wedded to natural as opposed to artificial filtration, though the former

has proved to be a dismal failure in villages and a constant vexation in many towns.

It is even more astounding to have to state that, on the complaint of a single non-resident individual, the L. G. B. have recently declared the Brixworth Council in default as to the "sufficient sewering" of one of the healthiest of their villages, Holcot, with a dwindling population of only some 300. The Inspector, who conducted the inquiry, refused to allow the question of the disposal of the sewage (if a scheme was adopted) to be even named, but as the subsoil is the stiffest clay in the district, and as the sewers would have to be laid in the used water-bearing bed, the Council unanimously refused thus to jeopardise the health of the inhabitants.

Failure is written large right across the Brixworth District in their well meant but disastrous attempts to deal with village sewage by natural filtration.

The moral of it all seems to be that Rural Authorities dealing with small populations should try every expedient rather than water-carried sewage. But that if that system has to be adopted, water must be conveyed to every closet, and the outfall should enter precipitating tanks, or be treated in settling tanks before it reaches the filter bed.

"*Sewage Disposal and Official Hindrance,*" *by* ALDERMAN COMPSTON, Rawtenstall.

ONE almost tires of the sewage question, but it will not let us rest, for sewage, like the poor, is always with us, only more so, and must be dealt with.

To begin at the commencement, we compel property owners to provide sound facilities for its quick conveyance from every place where it originates, and no less ought we to require of each cottager or other occupier that the drains and conveniences provided for him shall be rightly used both for his own and his neighbours' well-being.

Secondly, the fœcal and other sewages are received by the town's sewers, mix, putrefy as they flow, and give off foul gases. We know better than attempt to seal up these effluvia in the sewer; on the other hand we give them vent by manholes, etc., into the roadways; that is, we let the foul sewers breathe into

men's nostrils and bedrooms that which may be the breath of death to some. Or, towns construct costly pseudo-ornamental shafts and expect, in a "will-you-walk-into-my parlour" hopefulness, to train up the sewer gas in the way it ought to go, that is, of course, heavenward. But unfortunately the hurtful effluvium oft' takes its own way. For "sewer ventilation" depends on variable atmospheric conditions which we cannot control, and even when machinery is requisitioned to compel an up-current it affects but a limited area when beneficial at all. On the other hand the Reeves plan of correcting *the sewage itself* as it flows, at suitable manholes, is thoroughly effective, the cost being small for the assured safety of the public health. Edinburgh is the latest adopter of this mode of preventing disease from sewer gas.

Thus far we have pretty fair sailing.

But the third stage of sewage disposal, that of the out-fall works, is where the tug of war occurs, the natural difficulties of making sweet the foulest thing on earth being augmented by the usually withheld sanction of a Government Department from any method, no matter how suitable and efficient for local conditions, unless vast areas of land are purchased also.

Now, however honourable and useful a body the Local Government Board has been and is, and however successful its plan of extensive land filtration in certain places (and this no one denies), is it reasonable of the Board to seem to ignore the fact that such method is to-day but one of three or four available alternatives, and economically impracticable in some congested industrial districts?

Soluble domestic sewage may be inexpensively and wholly disposed of as at Exeter; Col. Ducat's method is another alternative; Mr. Dibdin and others have also shown what can be done by artificial filtration; whilst Mr. Harris Reeves at Henley-on-Thames and also at Staines, has proved how land schemes, approved by the Local Government Board, and which had so failed after a few years as to become huge nuisances, bringing upon the sanitary authorities injunction after injunction, can by his combined chemical and earth treatment, on a limited area of land, successfully deal with foulest brewery and other trade-polluted sewage, economically and without nuisance. For from the moment he receives the sewage, by the aid of simple plant he renders it innocuous; and the sludge, being wholly inoffensive, is profitably put upon the land direct, thus saving the usually enormous cost of great buildings, engines, and high annual working expenses of sludge-pressing. This simple and successful method, *adaptable to varying kinds of sewage and ground*, is too little known by sanitary authorities.

Certain it is that at the present moment large sums of th people's hard-earned money, at the behest of the Local Govern ment Board, have been and are being *interred* without sure an certain hope of profitable resurrection.

While no local authority should be allowed to escape its sani tary obligations in avoiding river pollution, the Local Govern ment Board should not use its powers oppressively, nor b allowed to put authorities in the stocks of municipal disablemen because they have got a step beyond the somewhat quackish ide that just one remedy, and that the Board's, is the perfect cur for all districts in all circumstances.

Is it not open to this Congress to bring the matter before th Local Government Board, with a view to greater freedom o action and less waste of the people's money, while securin sufficiency of treatment?

CONGRESS AT BIRMINGHAM.

CONFERENCE OF MEDICAL OFFICERS OF HEALTH.

The proceedings of the Conference commenced with an address by the President, J. C. McVail, M.D., D.P.H., F.R.S.E., F.S.S., published in the Journal, Part III., Vol. XIX.

"*Bacteriological and Clinical Diagnosis in relation to some of the notifiable Infectious Diseases*," *by* J. W. Washbourn, M.D., F.R.C.P., Physician to the London Fever Hospital.

As the time at our disposal is limited, I will, without making any preliminary remarks, at once commence by discussing the diagnosis of diphtheria, confining my attention chiefly to that variety of the disease which attacks the fauces.

In *faucial diphtheria* the affection of the throat varies from a slight reddening and swelling without exudation up to the formation of a thick membranous exudation.

When there is a thick membrane upon the fauces the case is almost certainly one of diphtheria. Nevertheless, it must be remembered that other affections of the throat may give rise to the formation of a membranous exudation indistinguishable from that produced by diphtheria. I have personally seen several cases of this nature in which thick membrane could be peeled off the fauces, yet the membrane, on repeated examination, contained no diphtheria bacilli, and the cases were not followed by paralysis.

Much greater difficulty occurs in cases where the exudation is only slight, or where it is absent, or where it is of a pultaceous nature. Many of these cases cannot possibly be distinguished by the appearance of the throat from other inflammatory conditions. Sometimes the distribution of the exudation is exactly similar to that of follicular tonsillitis. In fact it may be stated on the one hand that the appearances caused by diphtheria in the fauces may be similar to those caused by any other inflammatory condition, and on the other hand that a throat having all the typical appearances of diphtheria may prove to be some other affection.

Generally speaking, if the exudation spreads to the uvula and soft palate the case is probably diphtheria; while if there is extensive destruction of tissue or the formation of an abscess the case is probably of some other nature.

From the appearance of the fauces we can never be absolutely certain of our diagnosis, although we can often form a very good opinion. Let us see what other signs there are to assist us.

An enlargement of the sub-maxillary lymph glands is of some value. They are more frequently enlarged in diphtheria than in other inflammatory conditions, but we cannot say much more. We may, however, say that an enlargement of the glands when the faucial inflammation is slight, is strongly in favour of diphtheria.

Albuminuria is very common in diphtheria, even when the attack is mild. It may, however, be present in various forms of tonsillitis.

When the glands are enlarged and albuminuria is present the probability of diphtheria is still further increased.

An extension of the inflammation to the larynx or the nose is strong evidence for diphtheria, but such an event may occur in other conditions. In scarlet fever it is by no means uncommon to get rhinitis, and sometimes the inflammation of the fauces extends to the larynx producing croup.

The temperature is not much guide, but a continued high temperature is not usual in diphtheria; it is often as high as 104° F. at the commencement of the attack, but it usually subsides quickly.

The subsequent occurrence of paralysis is often of assistance in the diagnosis of doubtful cases. Paralysis may occur after simple inflammatory affections of the fauces, but is decidedly rare.

It thus appears that purely clinical observations are inadequate to establish the diagnosis of diphtheria. We will now see how far a bacteriological examination helps us.

No one will deny that diphtheria is a disease due to the invasion of the body with the diphtheria bacillus, whatever influences may be necessary for the attack to be successful. Consequently the absence of diphtheria bacilli from the part invaded is certain proof that the disease is not diphtheria. Experience shows us that a bacteriological examination proving the absence of diphtheria bacilli can be relied upon. If, for example, no diphtheria bacilli can be cultivated from the throat in suspected cases of diphtheria after two or three examinations we can be almost sure that the bacilli are not present. As a rule one examination is sufficient, but to be certain, two or three examinations should be made. A negative result then is very

reliable; we must consider how far we can trust to a positive result.

In considering this question we must have a definite conception of what a bacteriological examination amounts to. The usual plan is for the medical man to remove a little of the exudation from the part affected with a sterile swab, which is provided by the laboratory where the examination is to be made. The swab is sent to the laboratory, cultivation is made upon blood serum or some other suitable medium, and the colonies which develop are examined microscopically. On the result of this examination a report is made that diphtheria bacilli are present or absent.

Can we absolutely rely upon a report stating that bacilli are present? From the strictly scientific point of view we cannot, as it is impossible to distinguish the true diphtheria bacillus from other allied micro-organisms by the method of examination adopted.

There are probably several bacilli which resemble the diphtheria bacillus in morphology, but I would especially call attention to the xerosis bacillus, a bacillus which is frequently present in the conjunctival sac. This bacillus cannot be distinguished from the diphtheria bacillus, unless such tests as the pathogenic effect upon animals are applied, tests which take too long a time for the purposes of clinical diagnosis.

We must, therefore, admit that the ordinary method of making a bacteriological examination of the throat will not enable us to say for certain that we are dealing with diphtheria bacilli; it only tells us that the bacilli found resemble the diphtheria bacillus morphologically.

But there is another difficulty, namely, that bacilli which, when subjected to all available tests, are found to be true diphtheria bacilli, are, at times, present in the throat, nose, and other parts without giving rise to any local or constitutional disturbance. The frequency of their occurrence, no doubt, has been exaggerated, allied bacilli having been mistaken for the diphtheria bacillus. We certainly cannot consider all healthy individuals in whose throats diphtheria bacilli are present to be suffering from diphtheria. Are they capable of conveying the disease to others?

Before considering this question, I would like to say a word about Hoffman's bacillus. This bacillus in some respects resembles the diphtheria bacillus, and is frequently present in healthy and in inflamed throats. I believe that it can be distinguished from the diphtheria bacillus by its morphology, and consequently by the methods of examination used for diagnosis; and I do not believe that it has anything to do with the causa-

tion of diphtheria. Bearing these facts in mind, we can now discuss how far the bacteriological examination assists us.

As the result of considerable experience, I believe that bacilli resembling the diphtheria bacillus in morphology are seldom found in inflamed throats, except in cases of diphtheria. Consequently when the throat shows clinical signs compatible with diphtheria and bacilli are reported to be present, we are justified in concluding that the case is one of diphtheria.

The question is, however, quite different in the diagnosis of doubtful cases of diphtheria of the nose, conjunctiva, or subcutaneous tissue. In these regions bacilli resembling the diphtheria bacillus in morphology are not infrequently present so that we ought not to draw any conclusion unless they have been proved to be true diphtheria bacilli by all available tests. Even then, there may be some doubt. Dr. Todd, for example, described a series of cases of infective rhinitis in one of the scarlet fever wards of the London Fever Hospital; and he found in the noses of the patients affected true diphtheria bacilli. None of these patients suffered from diphtheria of the fauces, nor did cases of faucial diphtheria arise in the ward. Until we have further experience it is impossible to say whether these cases were really diphtheria or not. Personally, I believe that they were and that the absence of faucial diphtheria from the wards could be explained by the mode of conveyance of the infection not being of a nature to produce the disease.

In any case, the whole subject of diphtheria of other mucous membranes than that of the fauces requires further investigation.

What course should be adopted when diphtheria bacilli or bacilli resembling the diphtheria baccillus are found in a healthy throat? Ought the individual to be isolated? Unless the bacillus has been proved by all the necessary tests to be a true diphtheria bacillus, we are certainly not justified in subjecting the individual to the hardships of isolation, and even then the question cannot be settled until we know how frequently true diphtheria bacilli are present in healthy throats. I personally believe that all individuals with true diphtheria bacilli in the throat or nose are infective, but I think that, with care, the risk of infection is not very great. Although isolation cannot be insisted upon, it should be practised when possible. In schools where diphtheria has broken out, and in scarlet fever wards of hospitals, a bacteriological examination of throats by the ordinary method is often of great service. We now examine systematically the throats of all the scarlet fever patients at the London Fever Hospital, and isolate as far as possible those with bacilli

resembling the diphtheria bacillus in their throat. Since this method has been adopted we have had no outbreak of post-scarlatinal diphtheria. Whether this is due to the isolation or not, I will make no dogmatic statement; still the fact remains. Again, at a large school diphtheria kept breaking out. At the request of the medical officer, I examined bacteriologically every throat which had the slightest suspicion of abnormality. Over a hundred children were thus examined, and all those with bacilli resembling the diphtheria bacillus in their throats were isolated. The outbreak soon ceased, and no further cases have occurred.

We may conclude from the above that neither the purely clinical nor the purely bacteriological examination is adequate for diagnostic purposes, but that when the two methods are combined we can form a correct opinion upon the majority of doubtful cases of diphtheria.

Scarlet Fever.—We will now discuss the diagnosis of Scarlet Fever.

A typical case of Scarlet Fever with its sudden onset, sore-throat, pyrexia, and rash is easy to diagnose at an early stage; while during convalescence, desquamation and the occurrence of various complications, such as albuminuria and adenitis, are of great diagnostic value in cases doubtful at the beginning.

Many cases are however atypical owing to the absence of some of the symptoms. Such cases may either be overlooked altogether, or be mistaken for some other disease.

It will be well to consider in the first place the importance which should be laid upon the individual symptoms.

The onset of the disease is usually sudden with sore throat and vomiting, the rash appearing within twenty four hours; but we must remember that in some cases the patient is ill with sore-throat and malaise many days before the rash appears. Cases of this nature may be extremely puzzling, especially if the rash comes out slowly, or is otherwise abnormal.

There is nothing specific in the condition of the throat. In the great majority of cases there is some inflammation of the fauces, which may, however, vary from a slight reddening without exudation up to extensive gangrene. Often the appearance of the throat is indistinguishable from that of diphtheria, especially those cases in which the exudation is of a pultaceous character. We must also be alive to the fact that scarlet fever and diphtheria may occur together, and here the diagnosis can only be made by a bacteriological examination or by the supervention of paralysis.

Undue stress is often laid upon the character of the rash in scarlet fever as a diagnostic sign. The typical rash is a

punctate erythema affecting chiefly the chest, neck, flanks, axillæ, front of elbows, groins, and the upper and inner parts of the thighs, leaving the face, scalp, palms, and soles free.

Now a typical scarlatiniform eruption may be seen in other conditions, such as septicaemia, the adminstration of drugs, etc. One of the most typical scarlatiniform eruptions I have ever seen was one following the injection of tuberculin. But the rash in scarlet fever is by no means always typical. It may be limited in its distribution to the flanks or to other parts, or it may extend to parts usually not affected. In children or in patients with delicate skins the palms and soles may be affected. As a rule the face is simply flushed, the punctate rash stopping short at the neck, but it may spread to the cheeks and temples. The circumoral ring of pallor, when present, is I think a sign of considerable value, but it is often absent especially in adults. The character of the rash also varies. It may be a uniform erythema without the punctate appearance. It is sometimes macular in certain parts such as the wrists, ankles, and the backs of the hands and feet, simulating the measles rash in appearance, but differing in being absent from the face.

A little later in the disease the appearance of the tongue is a useful diagnostic sign. The epithelium peels off leaving the tongue red with prominent papillæ, constituting the "strawberry tongue." In many cases this sign is absent, and a similar condition may be observed in other diseases.

During convalescence desquamation is the most characteristic sign. It may begin before the rash has disappeared, or it may be delayed for some weeks. Although a similar desquamation may follow many other kinds of rash, yet there are certain features in the desquamation of scarlet fever which are rather characteristic. Minute elevations of the epidermis appear, the tops of these separate, giving rise to little rings, which increase in size and coalesce so as to form irregular gyrate figures. The desquamation is usually a slow process, commencing on the chest, neck, face, and ears, while the hands and feet are affected last. In the case of most other rashes the desquamation is more rapid, and is limited to those parts which have been previously affected with the rash. However, this rule is not invariable, and in scarlet fever the desquamation may be so slight as to escape notice.

Some of the late complications, as albuminuria and adenitis, may help to clear up the diagnosis of a case which was previously doubtful.

We thus see that, as in diphtheria, none of the symptoms of scarlet fever are pathognomonic when taken alone. We will now consider what kind of cases offer the greatest difficulty in

diagnosis, and what diseases are most liable to be confused with scarlet fever. Mild cases are perhaps the most difficult. The rash and the affection of the throat may be slight or absent, and often it is not until desquamation has occurred or some late complication has arisen that the disease is recognised. Such cases are those by which the disease is frequently disseminated, and there is no method by which they can be detected.

At the opposite end of the scale there are cases which die before the rash has developed, and therefore before a definite diagnosis can be made; but these cases are exceptionally rare.

Cases with pyrexia and a scarlatiniform rash but without throat affection are difficult to diagnose. Most of these cases turn out by their subsequent history to be scarlet fever, but in others the diagnosis is never cleared up. When these cases occur in patients suffering from wounds the question arises whether the virus has not entered through the wound instead of through the usual portal—the fauces. The presence of a wound allows of the possibility that the rash and pyrexia are due to septicaemia, and in some cases it is impossible to make a definite diagnosis between this condition and scarlet fever.

In some cases of scarlet fever the rash is ill defined or transient, and the patient is seen for the first time by the medical man after it has disappeared. Under these circumstances, the history of the attack, a strawberry tongue, perhaps a little desquamation, and the affection of the throat may allow a diagnosis to be made. The question here generally is whether the patient is suffering from diphtheria, angina, or scarlet fever. A bacteriological examination of the throat will exclude diphtheria, and a careful investigation of the case will generally enable one to decide that scarlet fever is present in addition to angina.

Many diseases may be mistaken for scarlet fever. The most important, in addition to diphtheria and angina, are rubeola, morbilli, erythemata including drug rashes, septic eruptions, and the initial rashes of variola, and some other fevers.

The nature and distribution of the eruption may be characteristic. In scarlet fever the edge of the rash gradually fades into the healthy skin, while in many erythemata the edge is well defined. Initial rashes are often limited to the extensor surfaces and are markedly patchy. The rashes of morbilli and rubeola affect the face and are of a macular character. That of rubeola may easily be mistaken for scarlet fever, for although macular at first it may quickly become scarlatiniform on the body and disappear from the face. Under these circumstances it has all the appearances of the rash of scarlet fever, and the diagnosis must be based upon the history, the absence

of severe constitutional symptoms, and the condition of the throat. In some cases the diagnosis is quite impossible.

The difficulties which I have indicated in the diagnosis of scarlet fever will never be completely overcome until we possess some new method of investigation—a method with which we hope bacteriology will ultimately supply us.

Typhoid Fever.—Typhoid fever may be mistaken for so many diseases that an adequate discussion of its diagnosis would occupy much more time than we can devote to it on the present occasion. I will only touch upon the most important symptoms incidentally referring to those diseases in which the differential diagnosis is of especial interest.

During the first few days of the disease it is impossible to make a diagnosis, although the presence of headache, pyrexia, diarrhœa, and bronchitis is suggestive. A diagnosis cannot be made until towards the end of the first week when characteristic symptoms have appeared; and it must be freely admitted that many cases run their course without it being possible to make a diagnosis. This is especially true of mild cases, and since in children the disease is usually mild, the diagnosis is more difficult than in adults.

The most important diagnostic symptoms are pyrexia, rash, diarrhœa, tumefaction of the abdomen, bronchitis, and enlargement of the spleen.

The rash when well marked is pathognomonic; it is, however, often absent, or the papules may be so indefinite as to be indistinguishable from ordinary pimples. The short duration of the papules and their outcome in successive crops is very characteristic. The rash, except in those rare cases where it is exceedingly profuse, can hardly be mistaken for that of any of the other exanthemata.

Diarrhœa of the typical pea-soup character is an important symptom, but precisely similar diarrhœa may occur in other diseases such as ulcerative colitis, and in typhoid fever there is often constipation. The bowels may even act normally in typhoid fever, but this is a rare occurrence, almost invariably there is either diarrhœa or constipation. I always consider tumefaction of the abdomen a valuable sign when accompanied by pyrexia. A similar condition may be observed in various abdominal diseases, such for instance as ulcerative colitis, but it is absent in influenza and in other diseases liable to be mistaken for typhoid. It is by no means always present in this latter disease.

Bronchitis is almost always present to some degree in typhoid, and often gives one a clue as to the nature of an obscure case of pyrexia.

Enlargement of the spleen when present and accompanied by pyrexia and other symptoms is a valuable sign. It is sometimes hard, and then a doubt will arise as to whether we are dealing with an organ which is chronically enlarged from some other cause.

The course of the temperature is very variable but when it assumes the characteristic curve with a zigzag rise during the initial stage, and a similar fall during the stage of defervescence, and a more or less uniform line during the fastigium, it is a sign of high diagnostic value.

Except for the rash there is no symptom which can be called pathognomonic. Each case must be judged on its own merits, all the symptoms being taken into account. Much may be done by carefully eliminating other diseases,—pneumonia and phthisis by a careful examination of the lungs, malaria by searching the blood for malaria parasites, and so on.

The differential diagnosis from ulcerative colitis may present especial difficulties, for the symptoms of this disease are somewhat similar to those of typhoid, and a number of cases may occur together in institutions such as asylums. The principal symptoms are diarrhœa, hemorrhage from the bowel, pyrexia, and some tumefaction of the abdomen. The evacuations may be of a pea-soup character at first, but after a time they contain pus and mucus. There is no rash and the duration of the disease is as a rule longer and the symptoms less acute than in typhoid.

To discuss in detail the clinical diagnosis of typhoid fever would entail a description of the symptoms of a large number of diseases. We shall spend our time more profitably in considering how far bacteriology helps us in diagnosis.

There are two methods of bacteriological diagnosis, the one is the examination of the excreta for typhoid bacilli and the other is the serum test.

The examination of the fæces for typhoid bacilli is almost a hopeless task. The bacilli are not excreted in large numbers, and the presence of coli bacilli in the fæces renders the isolation of the typhoid bacillus exceedingly difficult.

In severe cases the bacilli are excreted in the urine, and can be isolated without much difficulty. Nevertheless, the identification of the bacillus under any circumstance is a long process, necessitating cultivation upon a number of different media.

It is rarely possible to cultivate the bacilli from the blood for they are never present in large numbers.

Altogether a search for typhoid bacilli during life is not of much practical value for diagnostic purposes. After death it is easy to isolate the bacilli from the spleen, and thus the diagnosis of doubtful cases may be made.

The serum test is, however, of great practical value. The test depends upon the fact that the blood or the blood serum of a patient infected with typhoid fever possesses the property of causing typhoid bacilli to clump together into little masses. The method of procedure is as follows. A little blood is removed from the patient by pricking the ear or finger, and is collected in a fine glass tube provided with a bulb in the centre. After the serum has separated it is diluted with sterile broth and a drop is added to a drop of a broth cultivation of the typhoid bacillus. If the mixture is examined under the microscope any clumping which occurs can be observed. The serum must be diluted at least twenty times, because the slightly diluted blood serum of healthy individuals may cause clumping.

Here, indeed, is where fallacy may arise, and inasmuch as in some rare cases the serum of normal individuals may cause clumping, the test is not absolutely reliable. Again, the serum of a patient who has previously suffered from the disease may give the test long after recovery.

The agglutinating properties of the serum, as they are called, are not manifest during the first few days of the disease, and the exact period at which they appear is variable. Consequently the test is of no value in the very early stages of the disease.

When the test can be obtained we may consider it of great importance from the diagnostic point of view; and if it is absent during the whole course of the disease, typhoid can almost certainly be excluded.

In conclusion, I would say that I have chosen these three out of the many notifiable diseases as types to indicate the difficulties of diagnosis. I have not entered into a full account of the diagnosis, but have rather attempted to touch upon such points as are likely to lead to discussion.

"*The Necessity for the Amendment of Part I. of the Housing of the Working Classes Act, 1890,*" *by* H. SCURFIELD, M.D., M.O.H. Sunderland.

(MEMBER).

I VENTURE to express the opinion that the beneficial effect of Part I. of this Act would be much greater if the proceedings preliminary to the execution of an Improvement Scheme were simplified, and more liberty given to the Local Authority in

determining the type of buildings to be erected on the "unhealthy area."

In most towns the proposal to spend the ratepayers' money over such schemes will arouse great opposition, and will only be carried by the strenuous efforts of a few ardent sanitary reformers.

Before the long drawn out proceedings in connection with the execution of the scheme are carried to a conclusion the enthusiasm of even a very ardent sanitary reformer will probably have been considerably cooled and he will think twice before he advocates a second Improvement Scheme.

In Sunderland there is a large district occupied by property in a very insanitary condition which can only be dealt with by Improvement Schemes. So far, one scheme dealing with a small portion of this district, known as the Hat Case Area, has been attempted. The area is about half an acre in extent, and there were about 480 persons living on it when the official representation was made to the Council by the Medical Officer of Health on August 31st, 1893.

The Improvement Scheme was completed in September and advertised in October, 1893.

The petition to the Local Government Board for the confirmation of the scheme was forwarded on November 27th, 1893. The Local Government Board inquiry was held on Jan. 18th, 1894, and the Provisional Order was made on the 8th of May, 1894.

On September 26th, 1894, a second Local Government Board inquiry was held on an application to modify the scheme. In September, 1896, the purchase of properties was so far completed as to enable a competition for designs for Workmen's Dwellings to be advertised.

The prizes in the competition were awarded in January, 1897. The first prize plans were then somewhat amended, and provisionally approved by the Council in March, 1897. The architect who drew up the plans and the Borough Surveyor were then deputed to interview the architect to the Local Government Board with a view to making such modifications, if any, in the plans as might be necessary for securing the approval of the Local Government Board. After this interview the plans were again amended. The amended plans were approved by the Council in June, 1897, and formally submitted to the Local Government Board on the 12th of July, 1897. In submitting the plans the Town Clerk represented that there was practically no one living on the area, and that the buildings were mostly in ruins and that the Council therefore wished to build on the whole area at once, instead of only on one half.

On November 30th, a reply was received from the Local Government Board desiring to know the exact proposals of the Council as to the relaxation of the regulations requiring only one half of the area to be cleared and built upon at a time, and at the same time stating that the plans were not satisfactory for the following reasons:—

(1) The plans provided insufficient open space.
(2) The plans provided accommodation for too few persons.
(3) The plans provided one-room tenements.

As regards objection (2) the plans provided accommodation for 454 persons instead of accommodation for the 480 persons displaced.

On December 18th, a deputation waited on the Local Government Board with regard to their objections to the plans. As a result of the interview the plans were again amended by providing more open space and accommodation for fewer persons, and by doing away with the one-roomed tenements.

The amended plans were approved by the Health Committee and provisionally submitted to the Local Government Board on February 4th, 1898. On March 11th, the plans were returned by the Board with an intimation that if the plans were now formally submitted to the Board by the Council, the Board would be prepared to direct a local inquiry to be held. On May 25th, the plans were approved by the Council, and on June 6th, they were submitted to the Local Government Board. On June 13th, an inquiry was held by the Local Government Board. Four years and eight months have thus elapsed since the petition was made to the Local Government Board for the confirmation of the scheme. Of this period two years were spent in the purchase of the properties and about four months in the competition for the plans of workmen's dwellings, the remainder of the time having been spent in correspondence and negotiations with the Local Government Board. Already more than eighteen months have elapsed since the architects were awarded the prize in the competition, but there is no prospect of an early start in the erection of the buildings.

All this delay is very disheartening to citizens who are really anxious to see the sanitary condition of their town improved. It appears to me that the Local authority might safely be entrusted with the erection of workmen's dwellings under this Act without having to submit every detail of the plans for the approval of the Local Government Board. Surely a Local Authority has a more valuable opinion than the Local Government Board on such a question as whether it is desirable to provide one-roomed tenements or not. In Newcastle-upon-Tyne

an improvement scheme was given up because the Local Government Board would not sanction one-roomed tenements, and this part of the Act has become a dead letter. In other towns I expect the same result will ensue unless the Act is amended so as to simplify the proceedings and give more liberty to the Local Authority in the execution of improvement schemes.

"*The Sanitary Service in Rural Districts in Ireland,*" *by*
JAMES HUGH FERGUSSON, F.R.C.S.I., D.P.H., &c.
(MEMBER.)

ABSTRACT.

UP to 1874 the sanitary laws in Ireland consisted of numerous Acts (permissive), and administered by different authorities. In 1874 the first compulsory Public Health Act was passed. This Act was repealed with all former Acts by the Public Health (Ireland) Act, 1878. Although this Act has to some extent been altered and amended by subsequent Acts, still the sanitary service remains as constituted by that Act.

Section 3 divides Ireland into urban and rural sanitary districts, the affairs of which are administered by urban and rural sanitary authorities, as the case may be.

Under the powers given by section 11, sanitary authorities appoint their officers. By it the dispensary medical officer is made, in virtue of his office as such, medical officer of health of the district or such part of the district as is under his charge, in addition to which the sanitary authorities are to appoint such other officers as the Local Government Board shall direct, with such salaries as the sanitary authority shall in such case determine, with the approval of the Local Government Board. The Local Government Board to assign to the different sanitary officials their respective duties.

These duties are most elaborately set forth in their "*Sanitary Order*" of the 15th August, 1879; also the different officials to be appointed, namely, sanitary sub-officers, medical officers of health, consulting sanitary officers, medical superintendent officers of health, and executive sanitary officers.

With such a staff of officials in each rural sanitary district with their duties so clearly defined, it may be asked: How is it that the sanitary condition of the rural districts leave so much to be complained of? The answer is threefold—the inadequate

remuneration paid to each sanitary official; the want of independent supervision; and I must add in many cases to the slackness and want of enthusiasm shown by both sanitary authorities and their officers in the discharge of their duties.

The salary paid a sanitary sub-officer varies from five to ten pounds a year; for this he must attend board meetings once a week, besides reporting to medical officers of health the result of his different visits and inspections, serving notices, &c. The answer is plain; no man could faithfully discharge these duties for the salary.

Medical officers of health are paid from ten to twenty pounds a year in addition to their salaries as dispensary medical officers, which would not do more than pay their car hire.

A consulting sanitary officer is generally paid a small yearly salary or a fee per consultation (and these as few as possible). He is often sent out to inspect and report on nuisances for same fee, thus saving his authority from engaging the services of a permanent medical superintendent officer of health.

Of independent supervision there is none, except in the large towns of Dublin and Belfast. The owners of property in rural districts are nearly all members of the Sanitary Authority, either elected or ex-officio, and are also the men on whom the dispensary doctor is dependent for his private practice. Can he report and ultimately prosecute, if necessary, these people? If he does, he ruins his private practice, and makes enemies for himself at his Board.

The remedy for this state of things consists in the Government, now that they have the opportunity, passing a short Bill compelling the New County Councils to appoint qualified medical officers of health for each county with the same tenure of office as the present county surveyor's, but elected by the county councils, and not allowed to practice their profession.

"*Regulations for the Burial of Persons dead of infectious disease*," *by* MEREDITH YOUNG, M.D., Mast. Surg., D.P.H., Medical Officer of Health, Crewe.

IT is apparent to anyone who has to deal with infectious disease that such diseases are spread to a considerable extent by circumstances occurring between death and burial. Personally I can call to mind numerous cases of small-pox, scarlet fever, and diphtheria, which have originated in connection with funerals, and doubtless these could be multiplied by other

observers to a large extent. Cases are recorded in the report on contagion and incubation of the London Clinical Society.

The infection of relatives, which so frequently takes place after the death of the sick person, and from the dead body, finds a ready explanation in the fact that the prolonged strain of nursing has almost always hope as an antidote, and when that hope gives place to grief the bodily vitality is so lowered that infection finds a ready nidus.

The necessity for keeping private the funerals of the infectious dead was recognised in the earliest times, and in the seventeenth century we have distinct proof of this, for we read in the City Remembrancia of London, in reference to the Great Plague: "that people who had died of the infection were buried late at night; that people who would have followed them had been sent away by threatening and otherwise, and that very few went with the bodies but those appointed for the purpose." (English Sanitary Institutions, pp. 97—98.)

The present paper has been inspired by a perusal of the admirable Reports of the Chicago Department of Health by Dr. Arthur R. Reynolds.

In that city funeral inspectors are appointed to supervise the funerals of persons dead of infectious disease; no body may be interred without a permit from the Commissioner of Health; undertakers must be licensed and certain regulations must be observed in all funerals, and especially in infectious disease funerals. Undertakers are taught the elementary principles of anatomy, chemistry, bacteriology and disinfection, as also of embalming—an art which is carried on to a much larger extent there than here.

Many of the regulations enforced with success for several years by the Chicago Department of Health are embodied in the suggestions contained in this paper, and I wish therefore to acknowledge fully my indebtedness to our Transatlantic cousins in this matter.

At the commencement I trust I need scarcely say that the necessity for the exercise of the utmost tact in carrying out any such measures as will be suggested cannot be too strongly emphasised. One of the barriers in our way is undoubtedly what is termed sentiment, and in this connection it is not a thing to be rudely thrust aside, but must be reverenced.

I wish to suggest that there should be some regulation of the funerals of persons dead of the following diseases:—

Asiatic Cholera	Membranous Croup
Small-pox	Typhus Fever
Scarlet Fever	Typhoid Fever, and probably also of Measles.
Diphtheria	

1. The first step towards administration is the obtaining of exact and reliable information of deaths from these diseases, and I think this would be best secured by making the *deaths* notifiable by medical men, or relatives, etc., exactly as is done with the occurrence of *cases* at present under the Infectious Diseases Notification Act, payment of the same fee being made. In many, if not in most, districts some such system as that devised, I believe, by Dr. M. K. Robinson, of East Kent, is in force for the immediate transmission of particulars of deaths from certain infectious diseases from the registrar to the medical officer of health. This, though a good plan, is not enough, for it is possible that in some cases the funeral may be over before the information reaches the medical officer of health.

2. Next in importance comes the question of preventing undue delay in burial. That can be secured by a strict enforcement of the provisions of the Infectious Diseases Prevention Act, 1890, relating to burial within forty-eight hours, and by an extension of this Act to the country generally.

3. Section 11 of the Infectious Diseases Prevention Act, 1890, contains provisions for notification to the owner or driver in the event of an infectious corpse being conveyed in any vehicle other than a hearse. Though the possibility of infection being spread by means of a hearse is only limited, yet it exists, and in my opinion should be controlled. This end may be secured by an amendment of the above section by a transposition of the words "a public conveyance other than a hearse" in the two parts of the section, to the words "a hearse or other public conveyance." Of course this is a more sweeping alteration than appears from a mere change of place of the words.

4. Relatives and others must be warned of the dangers attendant upon the funerals of infectious persons, and this warning may be effected by local authorities issuing through the registrars of births and deaths simply worded handbills laying stress on the following:—

(*a*) All burials of persons dead of infectious disease to be strictly private, and children especially to be excluded.

(*b*) The body to be placed in the coffin as quickly as possible, and the coffin to be closed at the earliest possible moment and securely fixed.

(*c*) The room in which the coffin stands to have the windows opened and to be kept private, all unnecessary furniture being removed before the coffin is placed there.

(*d*) The obvious but oft-neglected and serious danger of kissing the dead body to be once more pointed out.

(*e*) No person in a fasting condition to enter the room containing the dead body.

In regard to undertakers, handbills containing some such recommendations as the following should be issued by the local authority:—

(*a*) Before entering the room a cap and a full-length cloak or mackintosh, fastening securely at the neck and wrists, should be put on, and subsequently left for disinfection by the local authority.

(*b*) The windows of the room should be opened widely immediately on entrance if this be not already done.

(*c*) The nose and mouth of the dead body should be plugged with absorbent cotton wool saturated with disinfectant; the ears, if discharging, or any ulcerated, broken, or discharging surface, to be similarly dressed.

(*d*) In the Chicago regulations the body is to be "encoffined, either wrapped in a disinfectant sheet, or packed in insorbent cotton wool, saturated with the disinfectant." It is open to question whether this system is not wrong in principle, and I tend myself to think that merely wrapping the body, after washing with disinfectant to remove the surface bacteria, in that excellent bacteriological filter cotton wool, not too thick, would effect the same result with less likelihood of delaying too long the return of earth to earth.

(*e*) The coffin to be air and water-tight, though not of too substantial build (the lid to be tongued to fit into a groove on the sides) and the lid to be at once securely screwed down. The sawdust which is usually placed at the bottom of the coffin, covered with undertakers' lint or cotton wool, to be saturated in disinfectant. The necessity for this will, I think, be obvious.

(*f*) After being closed, the coffin to be sponged over with disinfectant, and then taken out of the room in which death has occurred into another room as recommended before. The removal of the coffin will allow of the sick room being immediately disinfected.

(*g*) In the event of any infectious body having to be removed any distance by road or rail, it should be enclosed in a metal shell hermetically sealed.

(*h*) No coffin containing an infectious body should be taken inside any place of worship or cemetery, chapel, etc.

(*i*) An infectious body should not, if possible, be buried in a vault, but if this be unavoidable then it should be "immediately embedded in and covered with good cement concrete, not less in any place than six inches in thickness, or wholly and permanently enclosed in a separate cell constructed of slate or flag, not less than two inches thick and jointed in cement, or of brick in cement, and in such a manner as to prevent as far as

practicable the escape of noxious gas." (Model Bye-laws for Cemeteries).

Graves in which infectious bodies are buried should be specially registered or marked by the cemetery registrar, should be at least 8 feet deep, and should not be reopened at any time.

Incidentally I may allude to the risks of the absurd custom of juries viewing the dead body. A few years ago, a Police Sergeant called me in quite accidentally to see the dead body of a man who had dropped dead on his own doorstep. A few minutes' examination made it perfectly clear that the cause of death was pure hæmorrhagic small-pox. Imagine the result if the twelve good men and true had viewed the body in order to try and conjecture the cause of death previous to recording a verdict of "Fatal Syncope," "Collapse," or some such thing.

Regulations on one or other of these points are carried out now by many local authorities—for example, the burial of a person who has died in a fever hospital must take place direct from the hospital to the grave, and this can be enforced under Section 9 of the Infectious Diseases Prevention Act, where this Act has been adopted. It is the practice in some districts for one of the Sanitary Inspectors to accompany all such funerals, to see that this provision is complied with.

It is with regret that one notices the failure to prohibit in the Irish Local Government Act just passed the custom of the "waking of the dead"—a practice which, however far justified by tradition, is yet full of danger in certain cases. It is prohibited under a heavy penalty in the Glasgow Police Amendments Act of 1890.

At some enlightened future date we may, perhaps, hope to see some such recommendations as I have named made compulsory by legislation. Until then we can only hope to educate the public and the undertakers to a sense of the very real danger there is in a lax management of these the last rites of the dead.

"*Hospital Reform from a sanitary point of view,*" *by* T. GARRETT HORDER, Hon. Sec. Hospital Reform Association.

AT first sight there does not appear to be a very close connection between hospital reform and sanitation, but I hope to be able to show you that the measures that have been advocated by the Hospital Reform Association, would, if carried out, prove distinctly beneficial to the community at large.

That much more attention is paid now-a-days to the sanitation of hospitals is happily true. That many defects still remain, especially in the older institutions, can hardly be denied, and it is probable that no measures that could be taken, short of rebuilding, would prove entirely satisfactory. Although much has been done to improve the accommodation for the resident medical and nursing staff, yet I think it must be allowed that much still remains to be done in that direction. That all persons who have to live under the hospital roof should have airy and cheerful living and sleeping rooms goes without saying. I should not on my own responsibility go so far as to say that possibly the Committees of Management have not in the past taken that interest in the well being of the resident staff that they ought to have done, but I am confirmed in my opinion by such an experienced hospital manager as the Honorable Sydney Holland. In a paper read by him at a meeting of the Hospitals' Association in 1896, he made use of the following language: "If I have been deeply impressed with one fact more than another it is this; that a large number of the Committee men of many London hospitals are absolutely ignorant of almost every detail connected with their hospital. They knew their way about it, some of them, not all by any means; they know enough of their matron and secretary to believe her and him when they are told that their hospital is the best in London, but they do not know the conditions or inside of any other hospital to compare with their own; they do not know the pay or hours of their own nurses nor where they feed or sleep. They have never given the smallest personal attention to making the lives of these young women easier or happier. They do not know the procedure as to out-patients or in-patients, and they know nothing whatever about the in-patients themselves. This is a fact tested by me in many cases. I state it with a knowledge that it is sure to bring me great and immediate popularity."

Such a statement appears to me to prove the necessity of establishing in all our large cities, Hospital Councils or Central Boards, to whom the Public could apply for guidance and help before making their contributions. Although this question has not yet been brought to a satisfactory solution in London, yet it is extremely gratifying to note that the Council of the Prince of Wales's Hospital Fund has determined to inspect every hospital before making any further grants to their funds. One can hardly help expressing surprise that a similar course has not been adopted by the Council of the Metropolitan Hospital Sunday Fund. Recent investigation has proved that in this particular respect Dublin is far ahead of any other city in the United Kingdom. Not only is every hospital which applies for

a grant regularly inspected by a Special Committee appointed for that purpose, but the results of that inspection are printed and published for the use of the Public. Moreover, every detail in connection with receipts and expenditure is set forth in these Reports.

It has always been a matter for surprise that so much mystery has surrounded the mode of distribution adopted by the Council of the Metropolitan Hospital Sunday Fund, and this mystery has hardly been cleared up by the elaborate explanation which the Chairman (Sir Sydney Waterlow), vouchsafed some months since.

In the Report of the Dublin Sunday Fund everything is made perfectly clear, and I would strongly recommend all those who are interested in such questions to procure a copy.

From the point of view of the Hospital Reform Association, it is very satisfactory to note that the Council of the Dublin Sunday Fund take no note, in awarding their grants, of the number of *ordinary* out-patients. They do however, take into consideration the number of accidents treated in the external department. I may mention that many of the Dublin hospitals are also inspected by two other Committees; one appointed by the Lord Lieutenant on behalf of the Government, and one appointed by the Corporation of Dublin. Each of these Committees print and publish Reports. Dublin may be said to be exceptionally fortunate with regard to the support of her medical charities. Last year eleven of her hospitals received from the Government grants amounting to £16,022; seven hospitals received £1,750 from the Corporation, and another hospital received £1,000 from the County of Dublin.

I trust I have not wearied you with these preliminary remarks. I made them because the hospital question is just now one in which most people are interested.

To come now to the more particular object of my paper, I will place this proposition before you: That the aggregation of large numbers of sick people in the out-patient department of our hospitals and infirmaries is detrimental to the well-being of the patients, is unnecessary, and is likely to cause the spread of infectious disorders.

Take the usual waiting room of a large city hospital, and what do you find? A large congregation of men, women, and children (and more particularly the two latter) suffering more or less from every conceivable disease, mixed indiscriminately together patiently waiting their turn to be called before the physicians and surgeons in attendance. Can the waiting room attendants be expected to distinguish between infectious and non-infectious cases? You could hardly expect them to

distinguish between a case of mumps and a case of ordinary swollen face, or between a case of roseola and a case of scarlet fever, or between a case of erythema and a case of measles. I am not in a position to give you many statistics bearing on this particular point simply because few hospitals publish statistics of the diseases met with in their *out-patient* departments. I can give you, however, figures from one hospital in Manchester, and one in Liverpool, which will prove to you that the danger of infection is a real and not a fancied one.

In the Clinical Hospital, Manchester, in 1895, the following cases were treated in the out-patient department:—

Measles	8	Erysipelas	2
Whooping Cough	9	Pediculi	40
Chicken Pox	6	Scabies	50
Enteric Fever	2		

In the Liverpool Infirmary for Children in 1896 the following cases were treated in the out-patient department:—

Typhoid Fever	9	Mumps	17
Scarlet Fever	15	Diphtheria	17
Measles	7	Pediculi	47
Whooping Cough	55	Scabies	32
Chicken Pox	32		

It may be assumed that a similar condition of things occur in the majority of the out-patient departments.

Apart from the danger of spreading infectious diseases, I maintain that much suffering is caused by the long hours of waiting, in a densely crowded apartment, that patients who suffer from acute disorders are made worse by long waiting in a vitiated atmosphere, and that the physicians and surgeons (especially the former, for as a rule there are twice as many medical as surgical cases) are wearied out by having to attend to such a large number of patients and are consequently often not able to do full justice to cases that require their best energies to treat. It will be seen by the figures that I am about to quote that the out-patient department of our general and other hospitals is fast becoming unmanageable and that it will really be necessary to make some radical changes.

1. Birmingham.	No. of Out-patients in 1896.
The General Hospital	52,203
The Queen's Hospital	28,478
The Children's Hospital	12,987
The Eye Hospital	30,434

2. Manchester.

The Royal Infirmary	36,908
St. Mary's Hospital	9,988
The Children's Hospital	11,502
The Clinical Hospital	9,815
The Eye Hospital	22,364
The Hospital for Consumption	10,545

3. Liverpool.

The Royal Infirmary	15,132
The Royal Southern Infirmary	9,835
The Stanley Hospital	15,488
The Northern Hospital	5,630
The Infirmary for Children	13,832

In the Report of the Birmingham Hospital Reform Enquiry Committee, I find it stated "that the actual number of persons who received hospital treatment during the year 1889 can only be arrived at as a matter of estimate, and the Committee think that it may be put down as being somewhere between 140,000 and 150,000 persons. These figures (the Committee go on to say) are of very serious import. On the one hand they bear conclusive testimony to the high estimation in which the hospitals and their staffs are held by the public. On the other hand the existing medical staffs are overworked by reason of the swarms of out-patients who crowd to the hospitals for treatment. This puts unfair pressure upon the visiting physicians and surgeons, and is detrimental to the patients themselves in two ways. In the first place serious or complicated cases cannot receive that careful and prolonged medical investigation which would otherwise be afforded them, and secondly the length of time which a patient has to wait before his turn comes to see the doctor must often be injurious to him. There is a further evil which results from the overcrowding of the out-patient departments, namely, that from want of time the physicians and surgeons cannot adequately utilize them for purposes of medical instruction to the students. If the number of patients go on increasing at anything like the rate at which they have increased of late years, an utter break down of the present arrangements must be the result."

Then referring to the question of the ailments of out-patients the Committee say: "A man who cannot afford to pay for the proper treatment of a severe or complicated malady, or a long illness, may well be able to pay ordinary medical fees for a trivial ailment of short duration and it is an abuse of hospitals to take up the time of the eminent physicians and surgeons who constitute the visiting staff with crowds of *trivial* cases to the

detriment of the really serious cases which call for all their skill and attention."

It is plain that the question, whether a patient is a fit subject for hospital treatment, depends partly on pecuniary and partly on medical considerations. No one but a skilled medical man can be trusted to say whether a case is serious or trivial. But wherever the line should be drawn between fit and unfit cases the great weight of the evidence shows that as regards out-patients it is widely transgressed in Birmingham.

This misuse of the hospitals is naturally much greater in medical than in surgical cases. Dr. Simon estimated that out of 10,000 cases to which he referred 4,000 were trivial cases. Mr. Jordan Lloyd stated that very many of the cases he attended at the Children's Hospital were merely cases of neglected diet. Mr. Lawson Tait was of opinion that many patients came to the Hospital for Women "to see old friends and make new ones." When they came to be medically examined they described impossible symptoms and he found there was nothing the matter with them. Mr. Marsh on the day he gave his evidence had been consulted at the hospital for a spot on the arm which proved to be a flea bite, for a small superficial abscess, and by a woman who thought she must have cancer because her husband was said to have it. However, putting aside insignificant cases which ought to be promptly dealt with by the physician or surgeon before whom they come, the Committee would define trivial cases as including all such cases as could be efficiently treated by any qualified practitioner and required no special medical or surgical skill. Trivial cases so defined are *primâ facie* unfit for hospital treatment."

I have quoted the Report at some length because I feel that it is a most valuable contribution to the subject of hospital abuse, and one which deserves at the present time to be reproduced. I may be allowed to add that the conclusions arrived at by this Committee were as follows:—

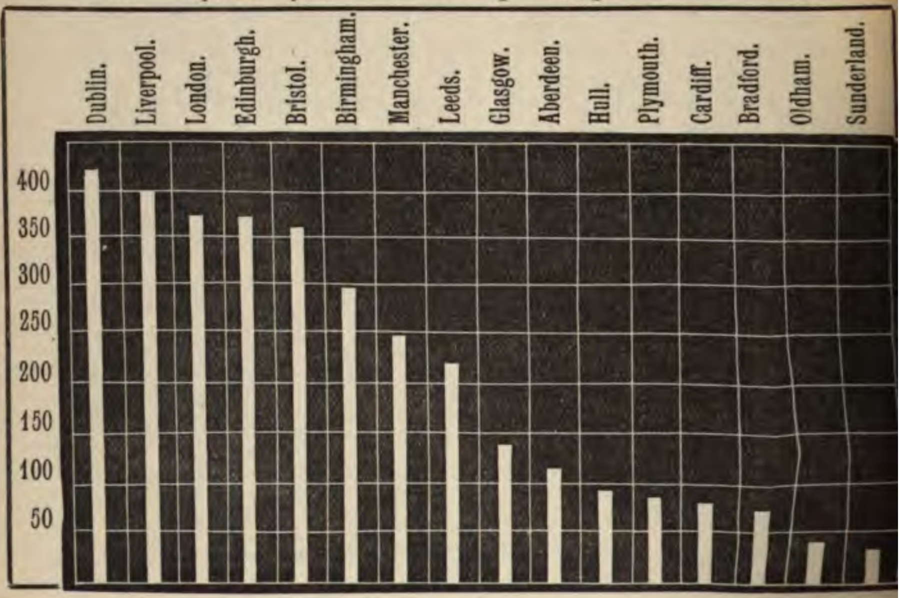
1. The formation of a General Council representative of all the public medical institutions of the city.
2. The formation of an Inquiry Agency to investigate the circumstances of applicants for treatment at the hospitals.
3. That apart from first aid and urgent cases, regulations should be passed by the hospitals to exclude trivial cases and cases where either the patients are in a position to pay for such treatment as they may require, or which could be more properly dealt with under the Poor Law.
4. That facilities should be given for cases, so excluded, being dealt with by dispensaries or provident dispensaries.
5. That any person recommended by an approved Provident

Dispensary or by a qualified medical practitioner, should as a rule be admitted to the out-patient department of the hospitals without further formality.

In conclusion, may I say that in addition to the above valuable recommendations it would be advisable to make provision for the periodical inspection of all hospitals by the Medical Officer of Health, and that officer should be requested by the sanitary authority to publish a report dealing with defects that have come under his notice. We have rules and regulations dealing with overcrowding, &c., in lodging houses; why shouldn't we therefore take every possible precaution to ensure that the sick in our hospitals are being dealt with under the most favourable hygienic conditions? In order that all chances of conveying infectious diseases in the waiting rooms, and also to discriminate between trivial cases and cures that really require hospital treatment, it seems advisable in all large hospitals to appoint a special resident medical officer to carry out such duties. It is well to note that such a system has been in operation for some years at St. Thomas's and St. George's Hospitals, and that recently the authorities of St. Mary's Hospital have made a similar appointment.

I fear I have wearied you with a somewhat discursive paper, but if I succeed in arousing public attention to this very important question I may hope for your forgiveness.

1892.—*Proportion of Out-Patients to Population per 1000 Inhabitants.*



CONGRESS AT BIRMINGHAM.

CONFERENCE OF MUNICIPAL AND COUNTY ENGINEERS.

The proceedings of the Conference commenced with an address by T. DE COURCY MEADE, M.Inst.C.E., published in the Journal, Part III., Vol. XIX.

"*Bye-Laws relating to New Streets and Buildings*," *by* J. S. PICKERING, Assoc.M.Inst.C.E., Surveyor and Waterworks Engineer, Nuneaton.

(MEMBER.)

IT is scarcely possible within the limits of a short paper to make any detailed reference to bye-laws affecting new streets and buildings. It is more with a view to elicit an expression of opinion on the subject generally that it is introduced. It is proposed to refer more particularly to bye-laws made in England under the provisions of the Public Health Acts rather than to bye-laws made under local Acts, but the author's remarks will apply in some measure to bye-laws with reference to sanitary matters in general.

The Public Health Act, 1875, empowers sanitary authorities to make bye-laws with respect to new streets and buildings, and repeals previous Acts under which such bye-laws were made. It provides, however, that bye-laws made under these repealed Acts are to be deemed bye-laws under the Act of 1875 if not inconsistent with the provisions of such Act.

In 1877 the Local Government Board drew up a "Model" series of bye-laws for the guidance of local authorities. These have been somewhat amended from time to time, and have been framed with great care, and under the best legal advice. What is also of the utmost importance is that their provisions are considered to be in accordance with the statutory enactments by which they are authorised. But notwithstanding these conditions the "Model" bye-laws have not been received with general approval.

It is true that bye-laws made since the passing of the 1875 Act generally adhere closely—and in the greater number of cases almost word for word—to the "Model" series, but this is not so much on account of their general suitability to the

districts for which they are adopted, as to the fact that the Local Government Board will not sanction any important departure from their "Model" code. The result is that many authorities do not possess any bye-laws at all, others depend upon bye-laws of doubtful validity made under former Sanitary Acts, while the great majority do not enforce the particular bye-laws they have been compelled to include in adopting the "Model" series.

It is somewhat astonishing that this state of affairs should be allowed to continue with the extension of local government which has taken place in the country, and when there is a general desire on the part of local authorities to carry out the provisions of the Sanitary Acts.

The varying circumstances of different districts make it impossible to frame a series of bye-laws applicable to all. Bye-laws for instance affecting new streets and buildings in large towns would be altogether unsuited to the requirements of say the villages of rural districts. But obvious as this is, it is a matter which is overlooked and accounts for the absence of bye-laws in many Rural Sanitary Districts.

Section 157 of the Public Health Act, 1875, provides that every Urban Authority *may* make bye-laws with respect to the following matters; the level, width, and construction of new streets, and the provision for the sewerage thereof; the structure of walls, foundations, roofs and chimneys of new buildings for securing stability, and the prevention of fires, and for the purposes of health; the sufficiency of the space about buildings to secure a free circulation of air, the ventilation and drainage of buildings, and the closing of buildings unfit for habitation.

Surely these provisions are of sufficient importance to make their adoption imperative. Possibly twenty-three years ago when the Act came into force it would not have been desirable to make the adoption of bye-laws compulsory, but considering the advance of sanitary science since 1875 and the general determination of the community to live in greater comfort, and consequently under healthier conditions there now appears to be no valid reason against the adoption of proper bye-laws in every sanitary area. It is evident that the Legislature do not accept this view or they would not continue to make the adoption of important sanitary measures permissive on the part of local authorities.

The Public Health Acts Amendment Act, 1890, contains many important provisions affecting the health of the community, but they cannot be put into force without months of delay in complying with the wearisome details provided for in the adoption of the Act. Section 23 of this Act gives to

sanitary authorities increased powers as to making bye-laws affecting new streets and buildings. Under this section a bye-law may be made with reference to the height of bedrooms and other rooms used for human habitation. It seems almost incredible that until the passing of the 1890 Act, sanitary authorities in general had no legal control over the height of such rooms, although many authorities possessed a bye-law fixing their minimum height. This was one of many bye-laws inconsistent with the provisions of the Public Health Act 1875, and therefore *ultra vires*, but it has been carried out as though it possessed full legal force.

In many of the larger towns bye-laws made under the Public Health Act, 1848, the Local Government Act, 1858, and other Acts repealed by the Public Health Act, 1875, have not been amended, though repugnant to the laws of the country, and the authorities possessing them prefer to retain these, trusting to their legality not being questioned rather than adopt the more modern bye-laws as sanctioned by the Local Government Board. This position on the part of local authorities should scarcely be possible; in any case it should not be a necessary position to take up in order to secure bye-laws adapted for the health and convenience of a district, for it must not be overlooked that many of these ancient bye-laws, as in the case of the one referred to, are eminently desirable, whatever may be said of their validity from a legal point of view.

Bye-laws made under Acts previous to the Public Health Act, 1875, are, as a rule, so conveniently elastic that this is another reason given for their retention in preference to the rigid bye-laws of the present day. The following are specimens of the bye-laws in force in a town with a population of upwards of 130,000:—

> "The walls of every new building shall be constructed of such thickness as shall be approved by the said Council.'
>
> "The owner or occupier of every house shall provide proper ventilation in the drainage thereof by means of the rain-water pipe from the roof of the house, or by such other method as the said Council shall direct."

These are a striking contrast to the detailed bye-laws referring to the thickness of walls and the ventilation of drains in the "Model" series, and yet they are only examples of similar bye-laws in force in numerous large towns.

Another convenient old bye-law is one giving the authority discretionary power with respect to the enforcement of air space at the rear of buildings. The Local Government Board will not now sanction a new bye-law which provides for this

discretionary power. But most sanitary authorities, nevertheless, do not hesitate to exercise their discretion when an occasion arises, such for instance as in the pulling down and re-erection of a building where the provision of the bye-law cannot be adhered to without considerable sacrifice of property. It may of course be contended that the air space is necessary for the health of the occupants of a dwelling wherever the building is situated, and more especially in a populous district where property as a rule is the most valuable. But an authority has often either to allow a building to be re-erected (and possibly improved from a sanitary point of view) without the requisite air space, or submit to it being altered in such a way that it will not come within the scope of the bye-laws as a new building. Discretion in a case of this description seems desirable, but it must be admitted that any general admission of discretionary power in the bye-laws would probably result in frequent acts of indiscretion on the part of some authorities.

Bye-laws of the "Model" series relating to the thickness of walls are seldom carried out in their entirety, especially in the smaller towns and rural districts where they have been adopted, where there is often a feeling that their enforcement may prejudicially affect the desirable growth of the district. So far as bye-laws can be prepared to meet the varying conditions affecting the thickness of the walls of a building, the "Model" bye-laws do not appear to leave much to be desired. Possibly the thickness prescribed for the walls of small houses up to three storeys might be somewhat modified to meet the objections usually raised against them in the smaller districts; but there will always be a difference of opinion as to what should be regarded as the reasonable and necessary strength of a building, and much will of course depend upon the quality of the material and workmanship.

As the powers and privileges to make (and necessarily to enforce) bye-laws under the Sanitary Acts have not been so fully appreciated as the framers of the Acts must have anticipated, it is a question what should be the proper course to be adopted to bring about a better state of things. That it is desirable for all sanitary authorities to have proper bye-laws affecting new streets and buildings there can be no doubt. However seldom it may be necessary to bring such bye-laws into operation they will be of service at some time or other, even in the most sparsely populated districts. If then suitable bye-laws are essential in rural districts, how much more important that populous towns should possess bye-laws framed with the highest possible considerations for health and convenience. This in the author's opinion will only be brought about by the adoption of bye-laws

being made compulsory, and a greater latitude being given to sanitary authorities to frame bye-laws adapted to their own particular districts.

But the possession and value of bye-laws will be of little effect if the necessary means are not adopted for enforcing them. Even in districts where there is an apparent desire to see the bye-laws strictly carried out, the surveyor's staff is generally so inadequate that the necessary amount of supervision cannot be given. In the author's opinion no new house should be occupied without a certificate from the surveyor that it has been erected in accordance with the bye-laws, and is fit for human habitation. But it would be manifestly unfair to expect a surveyor to give such certificate unless he had satisfied himself by systematic and regular supervision on the part of a competent staff during building operations that such certificate was justified. Then again, such a certificate could not be given where the bye-laws were not enforced. In some of the older bye-laws this certificate is required to be given, but it is not probable that a bye-law would now be sanctioned to this effect. Indeed, it would scarcely be desirable until the necessity for a better supervision of new buildings is recognised by sanitary authorities.

It appears to the author that many provisions contained in bye-laws might with advantage be incorporated in the Sanitary Acts, making them statutory enactments rather than measures to be adopted at the option of local authorities. It also seems desirable that bye-laws should be made less comprehensive, many matters of detail now included being made the subject of regulations varying according to the requirements of each particular district. Under these conditions a general series of bye-laws more acceptable than the present "Model" series could probably be framed, and sanitary authorities would be able to include in their regulations many important matters which would make bye-laws cumbersome and unnecessarily lengthy. In the case of new streets for instance, the bye-laws might very properly lay down the requirements as to widths under various conditions, but the actual method of construction would be better dealt with in detailed regulations, forming a practical specification of the requirements. Then again, matters connected with the drainage of a building could be more conveniently and in greater detail be referred to in regulations. It would add to the value of such regulations to accompany them with a complete set of descriptive drawings.

Many authorities supplement their bye-laws with regulations as to drainage and other matters, but as these are not confirmed by the Local Government Board, and very frequently contain

conditions which could not be legally enforced, they cannot be said to be wholly satisfactory.

In any revision of the "Model" bye-laws and the Acts under which they are framed, the author is of opinion that the Incorporated Association of Municipal and County Engineers might afford most valuable assistance. Throughout the Sanitary Acts and the "Model" series of bye-laws, there are many technical defects which the municipal surveyor could very readily rectify and thus put an end to much unnecessary litigation. The Local Government Board in 1877 acknowledged the assistance rendered by the Royal Institute of British Architects in framing the bye-laws dealing with new streets and buildings, and they would no doubt equally value the help of a professional body whose members must by their every-day experience possess a most intimate knowledge of the subject.

It is to be hoped that the time is not far distant when every sanitary authority in the country will be in possession of bye-laws which it will be deemed a duty to carry out in the interests of the health of the community.

"*Some Sanitary and allied Advantages attending the Introduction and Use of Motor Vehicles*," *by* E. SHRAPNELL SMITH, Honorary Secretary Liverpool Self-Propelled Traffic Association.

UTILITY and expediency combined are the best reasons for making the change from horse-drawn to motor-driven vehicles, and under "expediency" are placed matters affecting the public health, convenience and expenditure. The horse, that artist in haulage, is a useful and usually reliable animal, but the coming of the motor vehicle is proclaimed by their successful running during recent competitive trials when loads up to five tons were carried over average roads, and up more than average gradients. The object of the paper is to lead up to a discussion. The author does not propose to discuss the merits of the several systems now upon the market, but to deal with the subject in general terms.

Improvements in Sanitary Conditions.—The gradual elimination of the trouble of dealing with horse manure is the first and most obvious advantage. Accumulations in centres of dense population will no longer assault our olfactory nerves and reduce our vitality by putrescent emanations, and the ited fœcal matter, which is now pounded under the

traffic, will no longer be distributed on the breeze to irritate pedestrians and poison exposed food-stuffs. To-day, owing to the droppings of the horse and the deteriorating influences of its hoofs, an enormous amount of labour and expense is necessary for street-cleansing purposes. Prevention is better than cure, for which reason the sanitary betterment of our streets by the introduction and extended use of motor vehicles should be encouraged.

Reduction in Public Expenditure.—Sanitation and economy are closely connected, for reductions in one direction leave more money for application in another, and it is claimed that motor vehicles will effect a saving under more than one head.

Sub-divisions:—

(*a*) Working expenses.
(*b*) Road maintenance.
(*c*) Congested thoroughfares.
(*d*) Means of communication.
(*e*) Incidental advantages.

Working Expenses.—The more regular the work and the higher the gradients, the more economical does the motor vehicle become. The following figures are intended to indicate what might be realised in a town with hills normal in number and degree:—

COMPARISON OF COSTS OF WORKING.

Type of Vehicle.	Capacity.	* Maximum Load.	Daily Mileage.	Work per Annum.
		Tons. Cwts.		
Two-wheeled Cart	2·5 cubic yds.	1 5	16 miles	310 days.
Four-wheeled „ (London)	3·5 „ „	1 15	12 „	310 „
Motor vehicle	7·5 „ „	3 15	24 „	300 „

* It is assumed that the average weight of a cubic yard of refuse is 10 cwts.

TWO-WHEELED DUST-CARTS.

Prime Cost.

4 Dust Carts at £20	£80		
4 Horses at £60	240		
4 Sets Harness, Rugs, &c.	27		
Capital outlay	£347		

Annual Expenditure.

Interest at 5 per cent. per annum... ...	£17	7	0
Depreciation at 15 „ „	52	1	0
Forward	£69	8	0

Brought forward	£69	8
Fodder and Litter at 11s. per horse per week ...	114	8
Horsekeepers' Wages	12	0
Shoeing at 5s. per horse per month	12	0
V. S. at 20s. per horse per annum	4	0
Rent, Rates, and Taxes	14	0
Repairs to Carts and Harness	8	0
4 Drivers at 25s. each per week	260	0
Total per annum	£493	16

Say, 80 per cent. of the maximum load is carried,
50 per cent. of the total distance traversed:

Work done = (1·25 × 0·8) × (16 × 310 × 0·5) × 4 = ton-miles per annum = 9920.

Cost = (£493 16s.) ÷ 9920 = 11·95d. *per net ton-mile*, 5·98*d. per cubic yard per mile.*

Four-Wheeled Dust-Carts (London).

Prime Cost.

4 Dust Carts at £50	£200	
4 Horses at £70	280	
4 Sets Harness and Rugs	27	
Capital Outlay... ...	£507	

Annual Expenditure.

Interest at 5 per cent. per annum... ...	£25	7
Depreciation at 15 „ „	76	1
	101	8
Fodder and Litter at 15s. per horse per week ...	156	0
Horsekeepers' Wages	16	0
Shoeing at 5s. per horse per month	12	0
V. S. at 20s. per horse per annum	4	0
Rent, Rates, and Taxes	24	0
Repairs to Carts and Harness	16	0
4 Drivers at 28s. each per week	291	4
Total per annum	£620	12

Say, 80 per cent. of the maximum load is carried,
50 per cent. of the total distance traversed:

Work done = (1·75 × 0·8) × (12 × 310 × 0·5) × 4 ne ton-miles per annum = 10,416.

Cost = (£620 12s.) ÷ 10,416 = 14·30d. *per net ton-mile*, *c* 7·15*d. per cubic yard per mile.*

Motor Vehicle.

Prime Cost	£420		
Annual Expenditure.			
Interest at 5 per cent. per annum... ...	£21	0	0
Depreciation at 15 per cent. per annum ...	63	0	0
	£84	0	0
Fuel.—0·5 gallon Kerosene per vehicle-mile:			
0·5 × 24 × 300 = 3600 galls. at 5d. per gall.	£75	0	0
1·0 gallon per diem for raising steam ...	6	5	0
2·0 gallons per diem for incidental time not in active work	12	10	0
Methylated Spirit	2	0	0
Water.—3·5 gallons per vehicle-mile: 3·5 × 24 × 300 = 25,200 gallons at 1s. per 1000 gallons	1	5	0
Lubricating Oil and Waste	10	0	0
Rent, Rates, and Taxes	5	5	0
Insurances	8	8	0
Repairs	60	0	0
Driver at 35s. per week	91	0	0
Total per annum	£355	13	0

Say, 75 per cent. of the maximum load is carried,
50 per cent. of the total distance traversed:
Work done = (3·75 × 0·75) × (24 × 300 × 0·5) net ton-miles per annum = 10,125.

Cost = (£355 13s.) ÷ 10,125 = 8·31d. *per net ton-mile, or* 4·16d. *per cubic yard per mile.*

Summary.—A Motor Dust-Cart ought, by reason of its greater capacity and speed, to replace four horse-drawn carts. The economies to be effected by the change are approximately as follows:—

	London.	Provincial Cities.
Cost per horse per annum ...	£155	£123
Cost of same work by Motor ...	89	89
Saving per annum	43 %	26 %

Road Maintenance.—In the year 1831 a Select Committee of the House of Commons reported in favour of motor vehicles in this respect, after evidence by Telford, Macadam, and other road engineers. Personal observation of and reflection upon the differences between the nature and effects of the combined anchoring and levering action of the horse and of the mere rolling contact of the wheel tyres lead one to concur that the

horse is the more harmful. Driving contact scarcely differs from rolling contact in its effects, since the motor vehicle of to-day is not fitted with cross-bars, studs, or other forms of "gripping" contrivances upon the tyres.

Congested Thoroughfares.—In the fact that the motor vehicle reduces the longitudinal distance monopolised by each unit of traffic to about 50 per cent. of what we are accustomed to, there is a possible solution of this pressing question. The available street area will be used to better advantage, more room and less risk will be secured to the harassed pedestrian, and there will be fewer levies upon the rates for street-widening purposes.

Means of Communication.—Particularly where the traffic is insufficient to justify the laying down of a light railway or tramway. Motor vehicles are absolutely independent of route, of prepared way, of ballasted track, of central generating station, and of one another.

Incidental Advantages.—Accumulator propulsion of hackney vehicles will help to provide a moderate day load for electrical installations. The diurnal roar of traffic will be materially reduced, since rubber tyres will be almost universal. There will be less damage and loss of life, motors being under better control than horses.

The following resolution was unanimously adopted :—

"That this Conference of Municipal Engineers assembled in connection with the Congress of The Sanitary Institute this 28th day of September, 1898, is of opinion that the introduction and use of efficient Motor Vehicles should be encouraged by Municipal, Urban, and other Authorities, in view of the fact that the extended use of such vehicles would contribute to the general improvement of the sanitary condition of streets and towns, and this meeting recommends the Council of The Sanitary Institute to make known this opinion as widely as possible."

CONGRESS AT BIRMINGHAM.

CONFERENCE OF SANITARY INSPECTORS.

The proceedings of the Conference commenced with an address by the President, Mr. W. WEST, published in the Journal, Part III., Vol. XIX.

"*Overcrowding and its Remedies*," by T. C. BARRALET.

(ASSOCIATE.)

ABSTRACT.

THE tendency of populations to concentrate into towns is one of the characteristics of the human race, and becomes accentuated by civilization. All attempts to stop this tendency by legislation have failed, as evidenced by the growth of London.

Civilized commercial life ties the labourer to the towns as completely as the serfs of the middle ages were tied to the soil. The price we pay for being the leading manufacturers of the world is the divorce of half our population from the fields, and the decay of rural life. Railways and manufactures have proved potent forces in concentrating populations on small areas, and the spread of education in rural districts has swelled the immigration to the towns. On the other hand there is a growing tendency among richer townsmen to live in the country; but the number is so infinitesimal as to have practically no effect on overcrowding in the cities, while it positively aggravates it in the villages.

An abnormal growth of population is not necessarily a good thing in itself, but may imply that the conditions of life are unfavourable. A high standard of comfort generally implies a low birth-rate.

The mere aggregation of dwellings, however would not appear to be so inimical to health inasmuch as the mortality returns from densely populated urban districts do not much differ from those of less density, and the urban rates generally are yearly approximating to the rural.

It is the overcrowding *in* dwellings that is fraught with such physical and moral degradation, and the various Public Health Acts have failed to cope with the difficulty. Indeed there is reason to believe that such overcrowding is more prevalent than

ever, *pace* the revelations of the 1891 census, the evidence of the late Lord Shaftesbury before the Parliamentary Commission of 1885, and published results of investigations into the housing of the working classes in the villages. The Public Health Acts are punitive and coercive, not remedial, they give no definition of overcrowding and are powerless to deal with the type of overcrowding which may be described as intermittent, they fail also in not giving a sanitary officer the right to initiate proceedings. The writer gave several instances occurring in his own district. At seaside lodgings and boarding houses it is notorious that overcrowding is rampant, but one seldom hears of proceedings.

Overcrowding will continue to exist while it pays the owner, and while such owners dominate local authorities. Rents, especially of cottages, have risen universally, and in rural districts, within easy reach of London, are 50 per cent. higher than 25 years ago.

The Model Building Bye-laws though good in essence have intensified overcrowding by increasing the cost of building; the writer urges that timber framed cottages should be permitted in the country under restrictions, and that provision should be made to ensure a minimum air space in bedrooms.

Public authorities have not availed themselves to a great extent of the powers to provide dwellings which are conferred by the Housing of the Working Classes Act of 1890 and cognate Acts. Many of the large towns, however, have attempted to grapple with the overcrowding problem by the erection of dwellings, either in blocks, detached cottages or lodging houses, generally with favourable financial results.

In rural districts the Act has proved practically abortive through its clumsy and unworkable procedure, and the composition of rural governing bodies. Ireland is far ahead of Great Britain in the public provision of labourers' cottages. Municipal ownership has obvious advantages, and in the author's opinion, economic objections were overborne by the crying evils of overcrowding, and the urgent need for the erection of decent dwellings.

All measures aiming at making a working man the nominal owner of the house he lived in by advances from the public funds are to be deprecated as inimical to good sanitation in general, and strongly provocative of overcrowding.

Much may be done in mitigation by the encouragement and extension of cheap travel, but it must not be sectional or it will aggravate the evil it is intended to remedy; the zone system as in Austria-Hungary if adopted by our railways would cause our cities to grow symmetrically, instead of at the least desirable extremities.

Emigration might be a palliative for overcrowding, but it is not to be recommended, for our country is *not* overcrowded, no matter how our dwellings may be.

Though we cannot attain the late Sir B. W. Richardson's ideal in our cities of 25 persons to the acre, and the late Professor Huxley's minimum of 800 cubic feet in a room for each individual, we can keep these ideals steadily before us, and by using all the means in our power to remove to some extent one of the greatest blots on our civilization.

"*The Sanitary Inspector as a Teacher of Sanitation, especially in Rural Districts*," *by* TOM BLUNDELL.

(ASSOCIATE.)

ABSTRACT.

REFERENCE was made to the paper read by Dr. Kaye at the last meeting of the Congress upon "Hygiene in Elementary Education," and to the discussion which followed (see *Journal of The Sanitary Institute*, Vol. XVIII., pp. 482—487). The remarks of Mr. Pridgin Teale were especially dwelt upon. "The practical question in connection with instruction in hygiene was that of how it was to be done. It was the carrying out that was the difficulty, and not the convincing of people of the desirability of teaching hygiene."

The author expressed the opinion that the Birmingham School Board had overcome the difficulty, and he gave a brief outline of the method adopted for teaching science in the Birmingham Board Schools. A Chief Science Demonstrator with seven assistants gives practical teaching in science to the children in the fifth and higher standards of the boys' and girls' schools. The boys are taught mechanics and chemistry: the girls domestic economy. In framing the syllabuses of these subjects a wide interpretation has been given to these terms. To quote a few of the subjects of lessons:—"Impurities present in water and how to discover them"; "Necessity for, and methods of, ventilation"; "Germ theory of disease: nature and use of disinfectants;" "Systems of drainage: uses of drains and traps." These lessons are illustrated as far as possible by experiments, which are prepared and the apparatus got ready in a central laboratory. The materials are then packed in boxes and taken by means of a light hand-cart from

school to school, the same lesson being given to each school in turn.

The claims of the rural schools to similar education in elementary natural science are too apparent to require detailed notice. Such a scheme as that adopted by the Birmingham School Board would be less practical in rural districts, though here it should be possible for the managers of adjacent rural schools to co-operate and employ a qualified teacher.

It would probably take a long time to fully develop such a scheme. It is important that something should be done *at once* for these neglected parts.

County Councils are strongly urged to take up the subject in connection with their technical education, especially in the evening schools.

The Sanitary Inspector's certificate should be a good qualification for his appointment as teacher of such classes.

In the event of the managers of evening schools giving no support to such a proposal, the inspectors are asked to consider the advisability of giving occasional lectures in their districts without hope of fee or reward beyond a diminution of labour, due to the spread of sanitary education.

But supposing the enthusiastic sanitary inspector is announced to give a lecture upon sanitary science, it would probably be poorly attended. If, however, the inspector will give a lecture TO BE ILLUSTRATED BY EXPERIMENTS OR LANTERN VIEWS, he would be more likely to obtain a larger and more appreciative audience. A lecture is much more interesting when so illustrated, and to be able to show and prove what one is talking about would tend to fix and drive home the important points with absolute certainty.

The difficulty of obtaining apparatus was touched upon. Experiments were described that could be performed with ordinary household materials.

The Council of The Sanitary Institute were asked to consider the advisability of creating a fund for the purchase of apparatus, lantern, diagrams, &c., and loan them to inspectors on application.

Notes of Model Lectures (together with an appendix showing the apparatus required) might be published in the *Journal of The Sanitary Institute.*

"*The Working of the Shop Hours Acts in Bristol*," *by* F. W. SIMPSON, Inspector.

ABSTRACT.

MR. F. W. SIMPSON prefaced his remarks by an acknowledgment of the assistance given to him by H.M. Factory Inspectors in Bristol, Mr. Maitland and Mr. Shuter. He advised all Inspectors under the Shop Hours Acts to seek the friendship and assistance of the Factory Inspectors in their districts, as they would find the knowledge they would gain invaluable to themselves and the public. After referring to the Acts and to the steps taken in Bristol, he said he persevered in a shop-to-shop inspection, persuading some, threatening others, but always bearing in mind his Committee's instructions to use tact and discretion as a first, and penalties as a last resource. In the majority of cases he was well received, and upon his explaining matters he usually found people ready to comply with the provisions of the Acts. He spoke in high terms of the many thousands of employers in Bristol and other cities whose assistants' hours of work were many less than those allowed by statute, who looked after their assistants' comfort, saw them well fed, and in short treated them as human beings. It was not for such as these that the Acts were passed, and yet in spite of all that had been said and written on the subject he had always found that this was the class of employer who usually succeeded in building up a paying and substantial business. In the nine months ending December 31st last he explained the Acts to 4,173 employers, cautioned 1691 who were neglecting to exhibit the notice required, and succeeded in bringing about the shortening of the hours of 62 young persons who were being employed for a longer period than that allowed by the Acts. Having called upon all the employers he could find, he started to put the Acts into force. He pointed out that the members of a manager's or caretaker's family residing on the premises where they were employed were exempt. The members of a proprietor's family so dwelling were exempt. The wife's brothers and sisters were not in either case, neither were the members of a proprietor's family if they lived away from the business. The domestic servant clause he had never succeeded in solving to his entire satisfaction. The difficulties chiefly arose in hotels and dining rooms where barmaids, waiters, and boots usually lived on the premises. It had been the aim of his Committee to carry out the Acts as far as possible without having recourse to legal proceedings, but this could not be done in every case, and the

following was a brief summary of the proceedings which had been taken. Sixteen summonses had been issued; of these four were under Clause 4 for failing to exhibit the notice required, and fines were imposed. The remaining twelve were for working young persons longer than allowed. The shortest time for which proceedings were taken was 76 hours 25 minutes, and the longest 90 hours 45 minutes. He thought that the maximum penalty of £1 could be increased with advantage. He also thought that the Acts might be made compulsory instead of permissive with advantage. Again, in the majority of cases the limitation of 74 hours per week for young persons under 18 years of age appeared to be far too long, but of course this depended upon their duties and conditions of employment. He was pleased to say his lot had fallen in a pleasant place. His Committee took a deep interest in his work, he had able and genial legal advisers, and just and upright magistrates. But to those who might not be so well situated there was still the noble cause, and they should feel that they were fortunate to be the officials selected to stamp out one of the worst plague spots of modern civilization.

CONGRESS AT BIRMINGHAM.

CONFERENCE OF LADIES ON DOMESTIC HYGIENE.

The proceedings of the Conference commenced with an address by the President, THE LADY MAYORESS OF BIRMINGHAM, published in the Journal, Part III., Vol. XIX.

"*Village Nursing of Infectious Diseases*," *by* Miss C. J. WOOD.

ABSTRACT.

An economical and efficient system of village nursing has yet to be devised. The remote situation of many of the villages, the variable and irregular nature of the work, the difficulty of locating the nurse and of bringing to her side the various appliances of nursing, are all circumstances that complicate the problem, and above all, the distance from medical aid and supervision has to be considered.

In urban districts these difficulties do not exist, hence it is comparatively easy to place the nurse where she is required, or in the case of infectious complaints to remove the patient to an isolation hospital.

The existing Sanitary Acts provides authority under which arrangements can be made for the nursing of the infected villager, and through the parish council, which is the "parochial committee" of the district council for all sanitary purposes, the medical officer can take such action as he considers necessary. Where the machinery breaks down is in the absence of any nursing centre for the village. Time is lost, money is spent, in providing nursing from a distance and gathering together the necessary material for nursing an infected patient, during which time the infection may be spread.

The paper suggests a linked scheme; the area to be a defined and workable district, the centre of nursing to be either the local hospital, a cottage hospital, or the workhouse infirmary. At the centre a staff of fully trained nurses, one condition being that the sanitary authority of the district has a lien on their service. Village women carefully selected, to receive at the centre such training as shall fit them for simple nursing in the villages among their own class; the cottage of the village nurse, if occasion require, to serve as the village hospital, the

village nurse is thus available for immediate use in case of illness, and at the other end of the chain is the fully trained nurse, who can be requisitioned for the village, and can be assisted by the village nurse. In the event of a serious epidemic it should be within the power of the sanitary authority to make use of the whole nursing strength of the district where required.

The cottage nurse to have a special training for her work; to learn the elementary signs and symptoms of disease; the application of simple remedies, bed-making, dressing and cleansing wounds, antiseptic precautions, the handling of helpless patients; her training to be strictly practical. Her cottage also to be provided with simple nursing appliances. The village nurse could from time to time be sent to the nursing centre to be brushed up in her nursing.

The expense of the scheme to be met in part by voluntary contributions, and in part by a charge on the rates. The many voluntary agencies for district and rural nursing being drawn into the scheme, the subsidy that would be necessary from the sanitary authority to make a lien on the nurses being met out of public funds.

The Dorset County Health Association has worked out some such scheme, which is stated to answer well. The Holt-Ockley Association nurses only the cottager, and has no more fully trained nurses on its staff. The Essex Nursing Association is teaching the cottager class simple nursing. The weak point of all existing cottage nursing is that there is no control which would prevent these elementary nurses from going competing among the private nurses and taking fees.

"Sanitary Knowledge for Working Women," by
Mrs. E. Wakeford.
(Associate.)

ABSTRACT.

The opinion of Dr. Richardson on the importance of training women in sanitary knowledge was given emphatically twenty-one years ago.

Most sanitarians hold similar opinion to-day. Many other persons regard sanitation as man's peculiar study.

Physical conditions of woman's life make it natural that she

should be the home-keeper. On this keeping depends so much of health and life, that it is most important that women should be well trained in sanitary knowledge.

Much splendid work has already been done in this direction by various societies. Very much still remains to be done.

All women, because they *are* women, should receive sanitary training.

The working woman, above all others requires it.

1. Because she has little leisure and inclination to study these subjects for herself.

2. She is limited in her possibilities of effecting improvement.

3. She is a very potent factor in determining the physical and sanitary state of the next generation.

4. She often fails to realise importance of such training. Her training secured, certain improvements in health must follow.

How are these results to be secured?

Teaching is available for the eager and willing, to some extent. How are the *unwilling* and *indifferent* to be taught?

For women of *to-day* there is not so much hope as for the women of the *future.*

The great opportunity for influencing and impressing these lies in the *elementary day school.* Here every girl should learn the *general laws* of *health*, and *domestic sanitation* as a *matter of course.* It is as *necessary* as *arithmetic.* Many splendid opportunities for enforcing common principles of hygiene, even as things now stand, are allowed by teachers to pass unimproved, *not* because of the teachers' ignorance, but because of their lack of enthusiasm on the subject, and in some cases from failure to realise the importance and relation of these principles to every day work and constant well-being of themselves and pupils.

Members of School Boards might urge that as much sanitary teaching as is practicable should be introduced into all girls' schools.

Might not a thorough training of women in domestic science produce a class of women who would be competent to undertake housework, and would prefer it to insanitary and dangerous trades?

Every town and school should have its school or college of domestic science wherein every girl might graduate in womanly work, and domestic sanitation should be the foundation of all other domestic training.

Certificates from such schools might give a technical standing to homely domestic service, and also be a guarantee of efficiency to the employer of such servants.

"*Hygiene of Dress,*" *by* Miss M. S. Tait.

ABSTRACT.

Comfort the first requisite in clothing. How to ensure this comfort. Rules for the proper distribution of warmth, weight, pressure, and friction. Consequences of disregarding such rules. Injuries likely to ensue. Effect of undue pressure on circulation, respiration, and digestion. Congestion and displacement of vital organs induced thereby. Resulting nerve-exhaustion and kindred evils. Climatic influences. The so-called seasons unreliable. Thermometer the best guide. Occupations: active and sedentary—indoor and outdoor. Age and constitution a consideration. Relative value of different materials and their suitability for various purposes. Colour in relation to absorption and radiation of heat. Dyes: poisonous substances frequently used for production of certain colours.

Importance of proper washing and airing of clothes. Bed-clothing. Model garments. Health, comfort, and beauty *versus* Fashion.

"*Some Notes on Work as Officer of the Chesterfield Infant Life Protection Society,*" *by* Miss Ashwell.

(Associate.)

ABSTRACT.

Dr. Jones, of Liverpool, in his paper on the Perils and Protection of Infant Life states that:—

"The better protection of infant life is one of the most difficult and intricate of modern problems.

"Half the deaths of infants are due to bad feeding. . . . This bad feeding depends upon ignorance,—ignorance of the laws of health, of the care, management, and feeding of infants.

"The remedy, the only remedy in which I have any faith or confidence is Education."

Such educational work has been attempted in Chesterfield, a borough containing 26,000 inhabitants, mainly working class, colliers, with some mechanics and artizans.

Little or no employment for married women.

A high rate of infant mortality led to formation of Infant Life Protection Society. *Object.*—To take any steps that may seem desirable to diminish large number of preventable deaths among young children. Convinced that remedy was Educa-

tion, it was decided to impart this by visitation, distribution of leaflets, aid in nursing sick infants, and simple homely addresses.

Miss Ashwell was appointed officer. Qualifications: Practical nursing experience, certificate of Sanitary Institute, past work as lecturer on Hygiene and Sick Nursing for the Nottingham and Derbyshire County Councils.

Chesterfield not lacking in such causes as old property, overcrowding, defective and primitive sanitary arrangements, etc.

Method of Work.—Monthly lists of births, and deaths under one year of age are supplied grouped into districts and visited in rotation.

Visit paid to each house where birth taken place, a leaflet on "Infant Management" is bestowed, information gathered and imparted on many points, and where necessary practical instruction given in the care, feeding, and nurture of infants.

Contrary to many predictions a good reception, nay, a hearty welcome is accorded to visitor.

True that only too often mothers are ignorant, foolish, rough, and plain-spoken; yet also conscious of ignorance, anxious to remedy this, manifest no mere passive readiness to receive advice, but an active readiness to put same in practice.

Visits are appreciated, expected, and sought after; also leaflets for distribution to friends. Relatives, friends, and neighbours now report births, deaths, and illness, and make requests for visits.

Any person can secure services of officer by request at the Borough Health Department. The response, though markedly characteristic of younger women, also manifested by all classes, at all ages, by men and women. Doubtless it is to some extent due to better education, which renders possible an appeal to intelligence and to preparation of ground by the health teaching which is given in newspapers, lectures, etc.

Whenever possible repeat visits made, and as yet always found that some attempt has been made to carry out teaching given. Numerous instances known where whole families are gaining benefit from advice put into practice.

Such visits offer ample opportunities for teaching most important of laws of health.

In case of deaths under one year of age, visits also paid and much information gathered for purposes of comparison.

Simple homely talks given to gatherings of women on such topics as fresh air, refuse disposal, care, feeding, and management of infants, measles, summer diarrhœa, &c.

These addresses accompanied frequently by practical instruction and distribution of special leaflets.

Real interest is shown, and it is known as a fact that teaching thus given bears fruit, and is frequently handed on to neighbours and friends.

Difficulties and discouragements though present, spring in but small measure from those among whom actual work is done.

A practical difficulty overcome is the provision of a cheap wholesome tubeless bottle; Messrs. Robinson, of Chesterfield, now supply "The Chesterfield Health Bottle" at a rate which enables it to be sold retail for 3½d. complete.

Many difficulties beset the path of the best intentioned working-class mothers; such questions as milk supply, cheap, wholesome, good milk not shaken about hours before delivery, milk storage in places free from contaminating influence, are but some of the more serious ones.

This work makes great demands, calls for many qualifications, for infinite patience, tact, and enthusiasm; but for those who will thus pursue it, surely the future holds a rich if somewhat delayed reward.

As Carlyle truly says: "It is to you ye workers who do already work, noble and honourable in a sort, that the whole world calls for new work and nobleness."

"*The Claims of Childhood*," by

MARY D. STURGE, M.D.Lond.

JAMES ANTHONY FROUDE in his book "Oceana" says:—"It is simply impossible that the English man and woman of the future generation can equal or approach that of the famous race that has overspread the globe, if they are to be bred in such towns as Birmingham and Glasgow now are; and to rear their families under the conditions which now prevail in those places. Morally and physically they must and will decline,"—and again and again, throughout the book, he repeats his opinion that men cannot be reared in our cities in the present condition of these places.

Now if this statement be true—as I believe it is—the time has certainly come when women, whether seriously minded or otherwise, should think over and discuss together the conditions which go to induce the physical and moral degeneration of which Mr. Froude speaks.

Physical deterioration is, alas, but too obvious, in the narrow chests and stunted physiques to be seen daily in our streets,

while as further evidence of degeneration, we have merely to study the mental condition of our population. Leaving out of consideration our vast system of lunatic asylums and Infirmary wards for the imbecile and epileptic, it is still startling to learn how many mentally deficient children are born yearly in our slums, and grow up in our midst. We find that the term "dullards" is in recognised use amongst Board School teachers, to describe children whose mental power is slow and feeble, although they are supposed by the nation to be fit for the battle of life.

Philanthropists and educationalists are already on the alert with regard to this matter, knowing as they do, that these children go to swell the criminal ranks; the fact being that incapacity of mind and weakness of will lie at the root of much of the recklessness and wrong doing that abound.

Now the medical profession has deep knowledge, and therefore deep responsibility; but of this aspect of the case I must not speak to-day.

There is, however, a large field of work for the laity as soon as they have the honesty to admit to themselves that the birth of a miserable half-witted little child is an anomaly, and contrary to God's will; and that their duty therefore is to find out more about the Divine laws of health, which exist both for individuals and nations, so that they may act on this knowledge for themselves, and share it also with their fellows, thus helping to check the grievous waste of health going on around them daily.

One aspect of this wide subject has been too little considered, *i.e.*, the part played by heredity.

In order that a human being may grow up into radiant health, it is needful that its needs and *claims* should be recognised by its parents. These claims begin long before a child is born, and it is therefore only right that young married people should realize that the making and marring of the health and dispositions of their children rests with them throughout all the early years of their own engaged and married life.

You will say this is a truism: to which I reply that it is a fact which the world likes to ignore and forget, and therefore I make no apology for placing it before you now.

To my mind it would enhance the beauty and dignity of our national religion if a prayer could be introduced into the daily service of our churches to the effect that inasmuch as "No man liveth to himself and no man dieth to himself," so might the responsibility of parentage be recognised by rich and poor alike.

This influence of parents on their unborn children is difficult to trace out, because so often cause and effect lie far apart.

Frequently *years* elapse before results show themselves: for as the poet tells us—

"The mills of God grind slowly."

In fact, often the flaw in a child's heredity does not become manifest until the little one begins to grow into manhood, but then there may come a time where care and oversight are needed if the child is to be saved from a partial break-down.

As an example, imagine a girl of eleven, developing headaches and an irritable temper, and becoming a trial to the household. Before the child can be fully helped the family doctor has perhaps to go back in his mind to the gouty family history, and in addition to this he may happen to know that she arrived in this world very much too soon after the previous baby, so that the mother's constitution had not time to recoup itself between the births of the two children. Hence this second one was started in life with a poor supply of nerve force, which lasted awhile, but became definitely insufficient when the full strain of development was reached.

Now it is sometimes neither useful nor expedient that doctors should point the moral of a special illness or trouble, but we *can* quietly preach the doctrine taught by the old Latin saying, that:—"Parents live again in their children." This teaches that the reward of thoughtful and wise parents is great.

Moreover there is something grandly stimulating in the knowledge, that, day by day, care in regard to diet, and exercise, and culture, and above all in regard to self-conquest, will tell for good on the generations to come.

Let us look for a moment at the first great law of inheritance, which states that the off-spring *tends* to inherit every attribute of both parents. This means that inheritance is the *rule*, non-inheritance the variation to the law. Think of what this implies in the way of inherited tastes, inherited habits, inherited self-control.

When educated men and women grasp the far reaching power that is in their hands, they sometimes act upon their knowledge with the happiest results. The mother of Charles Kingsley believed that impressions made on her own mind, before the birth of her child, would be mysteriously transmitted to him; "and in this faith she luxuriated in the exquisite scenery of Dartmoor, and gave herself up to the enjoyment of every sight and sound which she hoped would be dear to her child in after life." Truly she had her reward! Her son was a lad full of vigour and joyousness, and he developed such unusual powers of mind as he grew up, that he was able to do good service for England in many ways.

A father also will unhesitatingly do real battle with himself

when he is convinced that the effort is worth making. Years ago I heard an Irish gentleman discuss this point with two other men. He told them that he became a teetotaler when he married, because he was determined not to handicap his children by handing on to them any bias in the direction of a liking for alcohol. He had been reading Farrar's article on "Alcohol and Heredity."

Now most men possess a spirit of chivalry, and I believe that all who have to do with men's classes and boys' clubs, can accomplish much by appealing to them on these lines.

Men *like* to be asked to take *large* views of life; and it ought to be possible to indicate to them their responsibilities with regard to their descendants.

Then, when they have gained an intelligent grasp of what is meant by inherited tendencies, press home to them the fact that inherited *weakness* is a misery to its possessor; and that undoubtedly the taking of alcohol by parents tends to diminish nerve power in the children, which is evidenced by epilepsy, imbecility, and feeble-mindedness.

But these truths must never be taught as a counsel of despair. Always must we emphasize the thought that the "battle is to the strong." Even the feeble will has a power of growth until it attains strength to resist. The world's progress has been possible, just because the good tend always to outweigh evil—because Nature and The Power behind her are ever striving upwards towards repair and towards health. So that it is never a hopeless task to deliver man from the slavery of an evil inheritance, if he will but accept the conditions of escape, and accept help to keep away from the things that tend to drag him down.

In this connection we must speak of education, for a true education during the early years of life is of infinite value, and happy is the child who receives a wise up-bringing!

Few of us realize how enormously a child is influenced by his surroundings, by the sights he sees, by the words he hears, and by the voices and lives of the men and women amongst whom he dwells. Day by day the unconscious building up of his character goes on, and this silent growth may be greatly modified and strengthened in certain directions by the wisdom of parents and teachers. Herein lies the power of education and the hope of every child.

Now all women should ponder over these things in their hearts, and I would suggest that they should be sometimes discussed at Mothers' Meetings and classes for elder girls. For example:—Clear interesting lessons may be given to the women, suggesting the *claims* of children to a holy heredity

free from vice and weakness. Show them a plant, and let them see how it fails to grow on bad soil, or if it be half-starved or kept away from sunlight. Then lead them on to understand the profound importance of the mother's position as being the soil on which the child at first grows.

Tell them plainly that if they want to be happy mothers much will depend on themselves and their actions; and that if they *will* drink tea all day and lace tightly, they will sooner or later have ruined digestions, and as a probable consequence puny infants. The poor know, without our telling them, that drunkenness in parents causes the children to be deprived of food and clothing, and turns the father into a heartless brute. But tell them that the alcoholic habit in the mother tends to impair the constitution of the child before it has entered the world: that it taints the mother's milk after the child is born, and deadens the mother's sensitiveness to the cry of her baby; and that, most terrible of all, it destroys the instinctive maternal feeling of tenderness towards her offspring, which is one of the main safeguards of a helpless child.

Some people will argue that there are many healthy-looking children to be seen in our streets, in spite of the disadvantages surrounding their birth.

We admit this, but the partial answer is that some of these healthy-looking children succumb to disease in a startling way, showing that their vitality is not great after all; whilst others of them become thin and fragile as they grow up.

Side by side with the first great law of heredity stands the second, known as the "Law of Reversion." We must always remember that characteristics tend to occur in the child which do not appear in the parent, but which have been exhibited by its ancestors. Every child is born with these hidden tendencies written, as Darwin says, in invisible ink; which same tendencies may develop or not, according to the surroundings of the child.

This law needs to be understood and remembered by our lawmakers and educated men, rather than by the poor, for it means that where a family possesses a history of consumption or of alcoholism, every effort must be made to protect the children from surroundings which may help to bring out the tendencies they inherit. Yet what do we allow?

We let the children of our cities freely enter public-houses, and thus accustom themselves to conditions which may to them mean a future downfall.

In this day of personal rights, some people hesitate to interfere with the lives of others, but we cannot evade our responsibilities in this way! We of the middle class are looked to for an example by those below us socially, and we have largely to

organize for them, since our experiences are wider and more valuable than theirs.

An army can only be effective and do effective work when a few master minds rule and guide and arrange for the troops as if they were children. You will agree that the soldiers of a regiment have *claims* on their superior officers for right guidance. So it is with our servants, our factory hands, and our children; they are greatly influenced by our example and our opinion, and they often need protecting by law from their own uncertain tendencies.

In the case of children the law is of use, both to protect the child and also to hold up before the parents some ideal of what the State expects from them in the work they have undertaken. At this very time we have sad indications that a new law is needed to forbid the chewing and the smoking of tobacco by young lads. We cannot expect a boy of twelve years of age to realize the danger to his health involved by this habit. And as for his parents, I fear that the average father regards a lad of fourteen as a minature man, who may play at being grown up. The truth is absolutely the reverse. In a boy of fourteen nature is straining every nerve with a view to developing him into a complete human being, some seven or eight years later on. And for this being (who is growing in all directions, and whose digestion needs to be at its very best during all these important years), it is semi-suicidal to tamper with a drug that tends to upset digestion, and that possesses a depressant action on the brain and heart. Professor Frazer of Edinburgh says:—"Smoking to any extent is productive only of injury to young persons. The special evils have been carefully investigated by a French writer Dr. Decaisne, who found that in the young even the restricted use of tobacco quickly produces dyspepsia, sluggishness of intelligence, and deterioration of the blood."*

In France there has been legislation in recent years directed towards checking this smoking amongst boys, and I believe that we now need something of the sort in England, or else we shall have the exquisite brain cells of hundreds of our growing lads depressed and injured, just at a time when their vitality is in a critical and sensitive state, and the developing brain craving nourishment rather than poison.†

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* Dr. Frazer adds:—"It would appear also that women are, like young persons, specially susceptible to the bad effects of tobacco."—*On the Use and Abuse of alcoholic stimulants and tobacco, by Professor Thomas A. Frazer. Edinburgh Health Lectures*, 1890.

† Stringent laws have been made this year in Norway forbidding the sale of tobacco to lads under sixteen, and forbidding their smoking in the streets, &c.

After all it is the nerve cells of the brain and spinal cord that are the head-quarters of body growth, as well as of intelligence, and on their nutrition much depends. And I believe that if little children only knew what was before them and could speak with us about these matters, they would most of all entreat to be provided with calm, healthy, nervous systems, wherewith to start along the road of life.

How many children are prevented the chance of having a healthy brain, which can be relied on for steady, calm working, both in childhood and in after years!

Few people are willing to recognise how frequently an equable temperament in adult life is dependent upon the right use of the days of childhood. The world seems to have forgotten that children need peace and prolonged sleep. We find even educated men and women engaged in encourging children to make efforts which are entirely out of keeping with nature's laws for the health of those children.

In the olden days a child wandered about in lanes, or lay on the grass looking at the sky, or stretched his growing limbs as he chased the lambs in the sunshine. At sunset, or before, he went to rest, and in the silence that fell upon the earth he slept soundly and awoke next day refreshed.

At the present time this need of sleep is recklessly ignored: mere babies are taken shopping at all hours of the evening, and tiny children are kept up late in order that they may sing at Band of Hope concerts. I once went at 8.0 p.m. into a London school to speak to the caretaker, and was astonished to find the whole place alight and alive with excited children dressed as fairies, and prepared for a concert only then about to begin.

It is children overstrained in this way who are brought to hospital later on with St. Vitus' dance, thereby costing the State and private charity many a guinea before they are even temporarily cured.

A child with its developing brain and mind needs much more sleep than an adult.

A newly born infant should sleep twenty hours out of the twenty-four.

A child of one to two years should have sixteen hours' sleep.

A child of four should have twelve hours' sleep.

A child of ten, ten hours.

Even at the age of puberty, when the child becomes a man or woman, more sleep is needed than by an adult.

For sleep is a form of nourishment. Every mother in the land ought to know that during the hours of rest the brain cells are recouping themselves, and getting ready for the effort of the next day.

Now this teaching might be readily emphasized if all School Boards, and officials, and clergy, and teachers would refuse to let their School Rooms be used for children's entertainments, unless it were promised that the children should be sent home at 7.0 or 7.30 p.m.

It is the last hour or so of the evening that takes more out of a child than its parents are at all aware of. The brain has been used all day, and towards evening sleep *is* needed, whether the child appears weary or no.

If we keep that child awake, we are putting a strain on the *reserve powers* of the brain, which powers are intended purely for growth and for repair. Thus we may seriously interfere with the silent processes of nutrition, which require the many long quiet hours of night for their completion.

Sleep must not only be prolonged, it must be undisturbed, and must be taken in fresh air, if it is to accomplish all that is needed. Alas, many infants have to sleep in crowded rooms, where lights are burning that use up the oxygen needed by the sleepers. Moreover, outside the room are to be heard sounds of street quarrelling, which become louder as midnight approaches and the people go home. What wonder that the babies start restlessly or even waken altogether!

It would be a blessed thing for children if the ancient English laws relating to the Curfew and the early putting out of lights were in force to-day; and such laws would probably do their elders no great amount of harm.

There is another time when the nervous system of a child needs long rest and quiet, and that is during convalescence from illness. It is a great mistake for him to be hastened back to the effort and competition of school life, too soon after even a slight illness, such as a heavy cold; and it requires a great deal of wisdom on the part of a School Board Officer to know when to be urgent or the reverse. Even well children really need a supply of fresh air and sunshine all day long, and yet think what we give them instead!

Unfortunately too often we dwell under a canopy of smoke, the individual particles of which cut off the sun's rays from our dwellings, and also attract moisture, so that we live in a damp unwholesome atmosphere. I am wearied of hearing people say "Smoke is wholesome." It is nonsense.

The actual little particles of carbon are when breathed not in themselves seriously injurious to the lungs; but there is no estimating the harm they do by hovering in the atmosphere above our heads. These smoke particles block out millions of rays of most precious sunlight, which would otherwise reach our dwellings, and would disperse foul gases and diseases, to say

nothing of their power to cheer the hearts and quicken the circulations of children.

In the Tudor period Parliament possessed a rational horror of coal smoke, and we are told that a law existed ordering Londoners to burn nothing but wood during the time that Parliament was sitting, in order that the health of the country squires who came to town might not be impaired. Our ancestors evidently recognised the true value of sunshine.

Further, as these particles hover above us, they form points around which moisture collects, so that a heavy manufactured gloom, or even fog, overhangs our city on days when we have a right to have the atmosphere sunny and clear.

Even if it should cost a little more to provide for the combustion of smoke, it would be amply worth while from the point of view of health, and I believe, by ignoring this question, that we are losing a great chance of reform in the building of our suburban factories and houses.

For it is in the laying out of our suburbs that many opportunities lie, and we should do well to devote much thought to the possibilities they hold out. The working man of the future *must* live there, and not in high flats in our cities. Let him claim his heritage of earth and bring up his children on a plot of ground, however small, on which they can build their cockle-shell houses, and develop their inventive faculties by playing honestly, and without the haunting dread of being stopped by the police,—a terror—in itself a demoralising factor in a child's life. Of course, a boy degenerates into mischief if he has no natural outlet for his ceaseless movements and his longings to experiment and to play! If he is checked and thwarted he develops into a loafer at a street corner—and what wonder?

Ladies, the claims of children are unceasing, and you will not be far wrong if you think of the body and mind of every city child as craving a fair heredity, a healthy nervous system, sleep, sunshine, and space. Let us do all we can to aid our landowners and our city councillors in their efforts for the common weal, remembering that

"'Tis worth a thousand years of strife—
'Tis worth a good man's *best* of life,
If he can lessen but by one
The countless ills beneath the sun."

"*Health Society's Work*," *by* Ernest Day, F.R.I.B.A.
(Member.)

The Legislature passed in 1848 the First Public Health Act, and in 1872 another Act was passed with additional powers, and providing for the appointment of Medical Officers of Health, so that the first date may be considered really the starting point of Sanitary reform in this country.

In 1875 another Public Health Act was passed, which consolidated the principal Acts of Parliament passed in former years relating to Sanitary Local Self Government.

These Acts were nineteen in number exclusive of the Public Health Acts of 1848 and 1872, viz.:—

Local Government Act, 1858.
Local Government Amendment Acts, 1861, 1863.
Sanitary Law Amendment Act, 1874.
Nuisance Removal Acts, 1855, 1860, 1863, 1866.
Sewage Utilization Acts, 1865, 1867.
Sanitary Acts, 1866, 1868, 1870.
Sanitary Loans Act, 1869.
Common Lodging Houses Acts, 1851, 1853.
Diseases Prevention Act, 1855.
Towns Improvement Clauses, 1847.
Towns Police Clauses, 1847.

Since the passing of the Public Health Act of 1875 a further Public Health Amendment Act was passed in 1890, and no less than twenty-five Acts of Parliament relating to health have been passed since 1871, viz.:—

Infant Life Protection Act, 1872.
Food and Drugs Acts, 1875 and 1879.
Rivers Pollution Prevention Acts, 1876 and 1893.
Canal Boats Acts, 1877 and 1884.
Factory and Workshop Acts, 1878, 1883 and 1891.
Public Health (Water) Act, 1878.
Contagious Diseases Animals Acts, 1878 and 1885.
Housing of the Working Classes Acts, 1885 and 1890.
Quarry Fencing Act, 1887.
Margarine Act, 1887.
Local Government Act, 1888.
Sale of Horseflesh Act, 1889.
Infectious Diseases (Notification) Act, 1889.
Infectious Diseases (Prevention) Act, 1890.
Public Health Acts Amendment Act, 1890.
Public Health (London) Act, 1891.
Isolation Hospitals Act, 1893.
Local Government Act, 1894.
District Councils (Water Supply Facilities) Act, 1897.

The Worcestershire Health Society was established early in 1890, the late Earl Beauchamp being Patron, its Council and Executive Committee numbering many of the leading county ladies and gentlemen, under the Presidency of Mr. Henry Howard. As the young society had but a small working fund, it was thought best during this initial stage to accept the gratuitous aid of several professional men who kindly volunteered to give lectures in various parts of the county and city of Worcester. Eight addresses were delivered by a local medical man on "The House and how to make it a Healthy Home." Five lectures, illustrated by diagrams and models, on "The House and how to Build it," were given by an architect, who drew special attention to important points affecting drainage and ventilation. Viscount Cobham, who presided at one of these lectures, pointed out the great necessity that existed for a right understanding of such matters, instancing the construction of a very magnificient building in London carried out for the Government, under the supervision of one of the best architects of the day, which yet, within a very short time of completion, was found to be flooded with sewage. He desired to see every man and woman in the land possess some knowledge of the axioms of sanitary science. He considered such subjects should be taught in the day schools, but if neglected there, he thought enormous good might be done by such institutions as the Worcestershire Health Society to increase the health and happiness of the people.

A local lady gave a series of eight weekly health addresses at a young women's club attended by factory workers, on "Cleanliness," "Household Management," and "Food," while a professional lecturer, sent by the National Health Society, gave two addresses in the city to ladies and working women on "The Nervous System."

In its second year, 1892, the Society sustained a great loss in the death of its patron Earl Beauchamp. The acceptance of the post by Lord Coventry still secured to the Society high interest, as both noblemen filled the office of Lord Lieutenant of the County. In this year the work done was entirely carried on by members of the Council who gave their services. The lectures delivered the first year were repeated in different parts of the country by the two professional gentlemen before mentioned. The same lady continued her health teaching at the Young Women's Club, it was followed by an examination which served to show that considerable interest had been awakened. Single addresses were also given by this lady to a Mothers' Meeting, and to members of the Girls' Friendly Society. An attempt was made to secure the co-operation of

the various local sanitary authorities by issuing an invitation to members of the medical profession, Inspectors of Nuisances, Mayors, Chairmen of Local Boards and Sanitary Authorities, to confer together and assist in the work of the Society, but unfortunately this effort did not meet with much response. The Society was however strengthened by the admission of several leading County gentlemen, notably by that of the Earl of Dudley, followed later on by the Countess of Dudley, whose services have been much valued.

In 1893 a grant of £50 was made to the Worcestershire Health Society by the Worcestershire County Council, which materially assisted the development of its work. A professional lecturer (Miss Homersham, M.R.B.N.A.) was engaged who gave a series of lectures on Domestic Hygiene to ladies in Worcester, Kidderminster, and Oldbury, with a view of securing, by means of this teaching, wider missionary efforts on health subjects. The aggregate attendance amounted to 4,204 and of these 22 ladies presented themselves for Examination.

Gratuitous addresses on healthy homes, infectious diseases, food, &c., were given by different professional gentlemen and by a lady in one of the club rooms of a large glove factory. In addition to this a very able presidential address on "The aims of a Health Society," was delivered by Mr. J. W. Willis Bund, Chairman of the Worcestershire County Council.

In this address Mr. Willis Bund pointed out that a Health Society should not rest content with efforts to lower the death-rate, but should endeavour to seek out and utilize all knowledge which tended to the preservation of a high standard of health throughout the community. This would involve careful oversight of structural defects in the building of cottages, and enforcement, where possible, of existing sanitary Acts, even where the initial outlay is great. It should seek to find out how far heredity and acquired habits were responsible for disease, in order to check such tendencies. The prevention of food adulteration and the raising of the nutritive value of food generally were of immense importance, and could well form part of the work undertaken by such agencies. Mr. Willis Bund laid stress on the advantages of periodical medical examination of the scholars attending our public elementary schools, in order to check the progress of insidious disease. There was also much necessity for special instruction to girls on the duties of motherhood and care of children, so that the high rate of infant mortality, mainly the result of ignorance and preventable accidents, might be lessened. A word of seasonable warning was given against the tendency to excessive physical exercise. A Health Society might try to impress on the modern young lady that to

become the mother of healthy offspring was more important than getting the largest amount of exercise into the smallest possible space of time. Mr. Willis Bund thought nothing would do more to bring clearly before the public the state of the health of the country than the publication of a disease map of the country, showing at a glance where particular diseases prevail, and forming a basis for enquiry as to the special conditions of life in different parishes, emphasizing what portion of the unhealthiness of the country was due to bad dwellings, and what to other causes.

The grant made by the County Council was increased from £50 to £100 in 1894, with the result that the Health Society was enabled to considerably extend its sphere of work. Miss Edith Sykes, Associate of the Sanitary Institute, was engaged, and seventy-four Lectures on Nursing, Clothing, and Food, were given mostly in rural districts throughout the County, with an aggregate attendance of 5,707. These Lectures were followed by an Examination passed by thirty-eight Members who attended the instruction. Gratuitous Lectures were also delivered by Doctors in different districts on "Health and Prevention of Disease," "Clothing," "Health in the Home," "Our Dwellings, past and present." In addition to this a large number of tracts and papers on sanitary subjects were distributed by Members of the Society, many of which were read by ladies at Mothers' Meetings.

The work done by the Worcestershire Health Society in 1895 was on much the same lines as during the previous year. A grant of £100 was again made by the Worcestershire County Council, which was expended by the Health Society in organizing 130 Lectures in various towns and villages at thirty different centres, mostly rural districts in the County. The aggregate attendances rose to 11,976, being an increase over the last year of 6,269, or an increased average of 15 per Lecture. A series of simple addresses on Nursing and Home Hygiene were again given by a lady at a Glove Factory Club, followed by examination for which prizes were offered by the Firm (Messrs. Fownes Bros.). A large number of pamphlets and health tracts were also circulated by members of the Society, or those in touch with it, at the different Lectures, Mothers' Meetings, etc.

In 1896 the Society's operations received a sudden check owing to the fact that the Committee of the County Council decided to discontinue their financial grant, and undertake themselves the work which had been set on foot by the Worcestershire Health Society. A few lectures were given in the city by the Society's lecturer (Miss Sykes) on Food, Air,

and Water; Feeding of Children; and Sick Nursing; but the Society felt that they must now seek some fresh channel for their missionary efforts. With a view of encouraging the study of domestic hygiene in the elementary schools the Society offered to provide text-books and to award prizes for the best papers written by the scholars entering the competition. Seven schools responded, and thirty-seven papers were received as the result of the examination. Prizes were also offered to non-professional ladies for the best written essay or paper suitable for reading at mothers' meetings. Very small response was made to this, though the first prize essay, written by Lady Georgina Vernon, was a valuable contribution.

The County Council having undertaken the work of health lectures to the adult population in the county, it was felt that the Worcestershire Health Society would do well to leave this field entirely untouched, and to direct their efforts to the education of the rising generation in the elementary schools on the laws of health. More particularly was this judged to be the right line to take as the County Councils are prohibited by legal enactments from this class of work in schools. In order to discuss the subject thoroughly and secure the sympathy and co-operation of those chiefly responsible for ultimate success, a large reception was held at the Victoria Institute, under the presidency of Lord Windsor, now President of the Society, to which all the school managers and teachers in the city and county of Worcester were invited; a considerable number of whom expressed their willingness to arrange for a series of three health lectures to the school boys and girls, to be followed by written examination for prizes. The Health Society gratefully accepted the very generous offer of a highly qualified lady, Miss Harlock, Assoc.San.Inst., to undertake this work without any fee beyond travelling expenses. These lessons, given to mixed classes of boys and girls in lecture form, were supplemented by questions to be answered in writing by each child, corrected and marked by the lecturer; only those being eligible for final examination who had gone through the course. Fifty-one lectures were given during the first session, 1897, in 17 schools with an aggregate attendance of 3,069; 212 candidates presenting themselves for examination. These results were considered by the Committee of the Health Society to be so satisfactory that they asked Miss Harlock's acceptance of a small honorarium to mark their sense of her able and persevering labours, at the same time offering her an engagement to continue the work during the following session. These lessons were found to be of value both directly and indirectly. The children gained valuable instruction on the virtues of pure

air and water, they were interested in a subject comparatively new to them, presented in an attractive form. Their eagerness to scan their corrected papers was a proof of this. Some of the children refused to leave the school-house, even when the hour for dismissal had sounded, without their papers, which were carried home to their mothers: thus indirectly information permeated from the school to the cottage, with what wide-reaching results it would be hard to say. In more than one school very marked improvement was made in the sanitary condition of the building and arrangement of the class-room, shewing that the managers and teachers were desirous of taking advantage of counsels so kindly and wisely given.

The second series was even more successful than the first, 531 candidates going in for examination out of a total of 3,088 attendances. Miss Harlock in her Report says, "I was particularly struck with my work in Hounds Lane Board School, Worcester. The children were certainly the poorest and looked the most neglected and uncared for of any I have come across. At first it seemed very difficult to find words simple enough to express what I wished to say, as their ideas were so limited. I almost despaired of doing any good work there. In my first Lecture I used an apple tree as an illustration of a fact which I wanted to bring home to them, but this familiar object brought little or no response. The Schoolmaster told me afterwards that the children were particularly dull, and that he did not think that six children in the whole school had ever seen an apple tree, or knew what one was like: but when the childrens' papers in answer to the questions at the end of my first lesson were sent to me, I was more than satisfied with them. They had written me such nice intelligent answers, and seemed interested too. Each time I went into the school I felt more and more that the work was worth doing." She attached great importance to the paper work done by the children, it kept up the interest from week to week and created a bond between the scholars and teacher, and enabled the latter to see where her meaning had not been perfectly understood.

There are several points, the result of Miss Harlock's experience, which it will be useful to bear in mind with regard to such teaching if it is to prove really successful. I cannot do better than give them in the lecturer's own words: "The Teaching of Sanitation in Elementary Schools."

1. "Be careful that instruction is fitted to audience.

2. "Keep clearly in mind the truths you wish to impress upon the children, then exemplify these truths by simple illustration drawn from the lives of the children you are talking to.

3. "Different teaching is required for town children and country children. It is useless to talk to country children about drains, &c., or to town children about contaminating wells.

4. "Avoid technical terms as far as possible, but where absolutely necessary be sure that the children understand what they mean.

5. "Difficult points must be gone over again and again and again until the principles are thoroughly grasped.

6. "The teaching is much more useful where the master or mistress is interested in the subject, and they get the children to write compositions on some of the points of the last lesson; this method keeps the interest up between the lessons.

7. "The kind co-operation of masters and mistresses is an essential requisite in making the lessons a success."

If members of the Health Committees in City and County Councils would take up the work of Health Societies outside their official duties, I feel sure great benefits would accrue to the present and rising generation.

I gather from the very able Health Report by Dr. Alfred Hill, of the city of Birmingham for 1897, published by the Health Committee, that the death-rate of infants under one year per 1,000 of births was 214, and the lowest out of thirty-three great towns was 131—figures which speak for themselves as to the need of missionary effort in this direction.

We are very much indebted to the Sanitary Institute for their zeal and energy in helping forward the work of sanitation. The conference here in the large and important city of Birmingham will, I feel sure, be a further testimonial to their excellent labours, and I hope the good seed sown may result in great benefit to all the inhabitants here and in the Midland counties.

In the year 1889 the Sanitary Institute favoured the city of Worcester with a similar visit, and the result of that Congress and Exhibition was in every way a success. It was felt locally that some action should be taken to commemorate their visit, and the formation of the Worcestershire Health Society, which I have made the subject of a large portion of this paper, was one of the results.

RESOLUTIONS PASSED AT THE CONGRESS HELD AT BIRMINGHAM, 1898.

RECOMMENDATIONS MADE IN SECTION 1:—

"That this meeting beg to recommend to the Council of The Sanitary Institute, the advisability of memorializing the Educational Department with a view to including teaching of the outlines of hygiene in the obligatory subjects of compulsory education."

Decision of the Council.—It has been arranged to further discuss the subject at a Sessional Meeting to be held in April, when Miss Alice Ravenhill will read a paper on "Practical Hygiene Teaching in Elementary Schools."

"That the Council of The Sanitary Institute be recommended to represent in the proper quarters the necessity for Sanitary Authorities having at least the same powers in reference to the sanitary conditions of schools as to work-places."

Decision of the Council.—Having regard to recent decisions in the Courts, the Council are of opinion that the present legislation is sufficient for the purpose.

"That this meeting recommends the Council of the Institute to take such action as may best promote the following objects:—

"The introduction into Parliament at an early date of a Bill, giving effect to the recommendations of the Royal Commission on Tuberculosis.

"The immediate acquisition by Sanitary Authorities of powers similar to those contained in the Glasgow Police Amendment Act, 1890, Sections 24—27.

"The urgent desirability for all public institutions, hospitals, &c., especially those which are rate-aided, to obtain their milk supplies from herds guaranteed free from tuberculosis by a competent veterinary surgeon.

"The provision by the Minister of Agriculture (in conformity to the recommendation of the Royal Commission), of tuberculin and the services of a veterinary surgeon being supplied free of charge to all farmers desirous of freeing their stock from tuberculosis."

Decision of the Council.—These resolutions are still under consideration in connection with other questions arising out of the Report of the Royal Commission on Tuberculosis.

RECOMMENDATIONS MADE IN THE CONFERENCE OF MUNICIPAL REPRESENTATIVES:—

"That the Council of the Institute be recommended to urge upon the Government the necessity for legislation to secure the registration of ice cream vendors, and the sanitary control of places where ice cream is made."

Decision of the Council.—That although very desirable in itself, the Council do not think it desirable at the present time to urge legislation upon one item relating to food preparation.

RECOMMENDATIONS MADE IN THE CONFERENCE OF MEDICAL OFFICERS OF HEALTH:—

"That the condition of the sanitary administration in the rural districts in Ireland is unsatisfactory owing to the want of independent supervision, and that the Government be urgently requested to remedy that defect by introducing a Bill early next Session requiring the new County Councils to appoint a Medical Officer of Health for each county, with the same tenure of office as the present county surveyors."

"That the Council of The Sanitary Institute be requested to approach the Government on the subject."

Decision of the Council.—That they are of opinion that the provisions of the Scotch Act making it compulsory for such officers to be appointed, should be extended to Ireland, and should also be enacted with regard to England, and they are pressing this upon the Government.

"That it be a recommendation to the Council of The Sanitary Institute to consider the advisability of taking steps to secure the amendment of Part I. of the Housing of the Working Classes Act, 1890, so as to simplify the execution of improvement schemes and give more liberty to Local Authorities as to the type of buildings to be erected on the 'unhealthy area.'"

Decision of the Council.—Still under consideration in connection with a Bill for the Housing of the Working Classes, to be introduced into Parliament this session.

"That the time has arrived when in the interests both of the Sanitary Medical Service and of the Public, Superannuation for Medical Officers of Health should be established, and that The Sanitary Institute therefore be requested to consider the best means of furthering this."

Decision of the Council.—The Council are of opinion that the salaries should be increased to an amount sufficient to enable the officers to provide for their own Superannuation, and that contributions to some fund for the purpose should be obligatory.

RECOMMENDATIONS MADE IN THE CONFERENCE OF MUNICIPAL AND COUNTY ENGINEERS:—

"That this Conference of Municipal Engineers assembled in connection with the Congress of The Sanitary Institute this 28th day of September, 1898, is of opinion that the introduction and use of

efficient Motor Vehicles should be encouraged by Municipal, Urban, and other Authorities, in view of the fact that the extended use of such vehicles would contribute to the general improvement of the sanitary condition of streets and towns, and this meeting recommends the Council of The Sanitary Institute to make known this opinion as widely as possible."

Decision of the Council.—Decided that no action be taken in this matter.

"That the attention of the Council of The Sanitary Institute be drawn to the recommendation of the Conference of Municipal and County Engineers at the Newcastle Meeting, requesting that at future meetings the papers should be printed and obtainable at least three days before they are read, so as to give a fair chance of discussion."

Decision of the Council.—This is under consideration in the arrangements for the next Congress.

Recommendations made in the Conference of Sanitary Inspectors:—

"That paper No. 2 (the training and education of Sanitary Inspectors, by E. Worrall) be printed in full in the Journal of 'The Sanitary Institute.'"

Decision of the Council.—That it was not desirable to print the paper in full in the Journal.

"That 'The Sanitary Institute' do support the petition of this Conference to be presented to the Local Government Board asking for the appointment of one or more Sanitary Inspectors on the proposed 'Sanitary Inspectors' Examination Board.'"

Decision of the Council.—That the intervention of the Institute would not be likely to further the object that the Inspectors had in view.

Recommendations made in the Conference on Domestic Hygiene:—

"That this Conference desires to draw the attention of the Council of The Sanitary Institute to the following questions now affecting the National Health, and urgently needing consideration."

(*a*). "The growing and injurious practice of tobacco smoking by young boys."

(*b*). "The need of an official centre for the Registration of Nurses for the purposes of employment in villages."

Decision of the Council.—That no practical action could be taken in this matter at present.

SOME PREVALENT FALLACIES IN VITAL STATISTICS.

By EDWARD F. WILLOUGHBY, M.D.Lond., D.P.H. Lond. & Camb. Univs.

(MEMBER.)

Read at Sessional Meeting, December 14th, 1898.

We are often told that "statistics may be made to prove anything," and so, like balance sheets, they may, and too often when ignorantly or fraudulently manipulated indeed; this remark, so flippantly uttered by indolence, incredulity, or indifference expresses a great truth, especially in respect of Demography, or Vital Statistics, the science on which all social legislation, sanitary improvement, and philanthropic effort must be based, for without figures we can prove nothing, and public action prompted by popular notions or individual experience is always hazardous.

Vital and social statistics have been aptly compared by Dr. Longstaff to "indeterminate equations, with many unknown quantities, of which approximate solutions only are possible." The qualifications of the statist are not those of the accountant or the actuary, he need not be versed in the higher mathematics, but he must have a naturally logical mind, trained in the methods of scientific inference, inductive and deductive, combined with a comprehensive knowledge of the subject under consideration, the various sources of fallacy incident thereto, and the disturbing influences to which its phenomena are exposed; for the conditions of several communities being rarely, if ever, even approximately the same in all or in most respects, crude recorded facts are always fallacious, and apparently obvious conclusions drawn therefrom seldom correct; the truth lying beneath, often very far beneath the surface, and requiring for its discovery all the skill of the practised expert.

Thus the most rapidly increasing populations may be fast tending to extinction; the healthier may show the higher death-rates; short-lived communities may boast the largest proportion of aged persons; the mean age at death may be low in the healthiest occupations, and deaths at advanced ages be no evidence of conditions favourable to health and longevity;

the natural increase of the entire population of a country may be accelerated or retarded at will without any change in the proportion of women marrying or the number of children to a marriage, the general mortality, or the extent of emigration; and, incredible though it may appear, it is possible that the very improvement in the sanitary conditions of the people now in progress, coupled with the falling birth-rate, may have for one of its consequences in the earlier half of the coming century a considerable rise in the annual death-rate which shall not indicate any deterioration of the public health. These paradoxes are all easily explained and are then pregnant with instruction; but it is rare to meet with a report on the sanitary conditions of a town, or the healthiness or unhealthiness of an occupation which is not more or less falsified by ignorance or neglect of the methods of correction.

It is impossible for me in the limited time allowed on this occasion to touch on the fallacies incident to all popular discussions of such social and economic problems as those of the so-called depopulation of the rural districts, and the migration to the towns, the distribution of wealth, and the growth or decline of pauperism, over-population, emigration, and other industrial questions in their relations to demography, and I must confine myself to pointing out a few of the most frequent and gravest mistakes arising from the abuse of statistics.

Estimated populations, based on the assumption that the rate of increase observed in the last decennium is maintained in the present, lead to serious errors in the calculation of the death-rate and the presumed healthiness of the community, for if the estimated differ from the actual population by no more than 10 per cent. plus or minus, a supposed death-rate of 24 per 1000 will represent a true rate of 26·4 or 21·6 respectively, and each successive census effects rude disillusions. Thus, in 1871 the population of Gosport was found to have been over-estimated by 33 per cent, and that of Cambridge under-estimated by 16 per cent., their death-rates being identical instead of differing by 12 per cent. In 1881 that of Kensington had been over-estimated by 26 per cent., and its vaunted death-rate of 15 per 1000 was turned into the very ordinary 18·75.

In 1891 the population of London was found to be, as Dr. Longstaff had predicted, a quarter of a million less than the Register General's estimate; the increase in the decennia 1871—81 and 1881—91 has fallen almost everywhere, in Nottingham from 34·3 to 13·6 per cent., in Hull from 26·5 to 10·9, in Salford from 41·2 to 12·4 and in Liverpool from 12 to decrease of 6·2; the deaths in fact had always been in excess of the births, the apparent growth of population being merely

the consequence of immigration, and ceasing as soon as this received a check. All the death rates had been understated, that of Salford as 3 : 4!

Constitution of population.—Since the end of the determination of the death-rate is to ascertain the accidental conditions, sanitary, social, or industrial, affecting the health of the people, it is necessary that differences in the essential conditions, which are not under our control, but none the less exert an influence on the death-rate, irrespective of those that are remediable, should be eliminated before any conclusions are drawn; or as logicians express it, that all the phenomena should be common except those which constitute the causes or the effects of the phenomenon that is the subject of enquiry. Foremost among these is the age and sex constitution of a population. Since the death-rate of children under 5 years is 63 per 1000, of persons from 5 to 25 only 6 per 1000, and of those from 25 to 45 years of age 10 per 1000, it is evident that a preponderance of individuals of one or other of these age periods will greatly influence the death-rate even should all other conditions be identical; and conversely that if the age constitutions be the same, the influence of those remediable conditions that determine an excessive mortality will be seen in the death-rate. The decennial reports of the Registrar General enable us thus to reduce the populations of every town or district to a common standard, thereby rendering them comparable. He publishes the numbers of persons of each sex and within each age period, together with the death-rate for each sex and age for the country as a whole, and the sex and age constitution of the population of each town separately. From these data one is able to calculate for any place two death-rates besides the crude or "recorded" rate, viz., the "standard rate," or that at which, *constituted as they are*, they ought to die if the conditions under which they lived were no better or worse than those of the country generally; and the "corrected rate," or that at which *under existing conditions*, they would die if only the relative proportions of persons at each age period did not differ from those of the nation taken as a whole. The standard represents a rate presumably attainable in the present state of civilization, and therefore to be aimed at; the corrected rate exhibits the naked truth, stripped of the accidents by which it was concealed.

One example, that of Manchester, will suffice to explain the meaning of these rates. In 1891 the crude or recorded death-rate was 28·67, the standard 19·09, and the corrected 31·95; the extremes of 32 and 19 representing the actual state of the population and what it might be with no better condition than those of England generally, and the difference 12·5 per

thousand, or 40 per cent. of the total mortality, indicates the amount that is preventable. Crude death-rates are determined far less by the sanitary conditions than by the ages of the people, and the aim of "correction" is to exclude this source of error. But there is in many towns a disturbing factor that cannot be eliminated, yet has not received the attention it deserves. I mean the presence of a large number of female servants, who, like all young unmarried women, tend to lower both the birth and death-rates but, unlike others, may be said never to die at all, for if they seem likely to do so they are at once sent to their homes mostly out of the district, and their places are filled by others from elsewhere. Their influence on the death-rate is therefore the same as would be exerted by the presence of a like number of immortals, and is greatest where there is no considerable working class population from which they might be drawn. Great public schools, universities and garrisons act in like manner, but are not so apt to be overlooked.

The *mean age at death* is of little practical value since the same mean may be obtained from very different extremes, as a high death-rate in early life with longevity among the survivors, and a low infant mortality with few cases of extreme longevity, the majority reaching a good age.

Better far is the mean lifetime of a population as deduced from life tables, or the age at which a generation, *e.g.*, 100,000 born, is reduced to half.

The *mean duration of life* obtained by dividing the population by the mean annual number of deaths is a fertile source of error. Thus, if 100 deaths occur annually in a population of 4,000, that is one person in 40 dies every year, the death-rate is 25 per 1,000, and the mean duration of life said to be 40 years. This, however, is true of a stationary population only, one in which the births equal the deaths, as in France, but most misleading where for two removed by death three are introduced by birth or immigration, so much so that with the highest birth-rate possible under the circumstances, the death-rate of 5 per 1,000 assumed by Sir B. W. Richardson for his Hygeiopolis might imply a mean lifetime, not of 200 years, as was hastily asserted, but of one little over the traditional threescore years and ten.

The expressions "excess of births over deaths" and "high and low (general) death-rates," though convenient and, in the absence of better, indispensable, are as Prof. Ruata, of Perugia, points out, inaccurate and liable to misapprehension. Since each event happens once and but once to all men, they must be equal in the end to the number of persons who have lived. The apparent excess of births is due to the increase in geome-

trical progression of actively reproductive individuals in the community; and by a high death-rate we mean an undue proportion of premature and avoidable deaths, in the reduction of which preventive medicine has achieved its greatest triumphs; *e.g.*, of a million children born 25,000 more reach the age of 15, and 40,000 more that of 30, than in the last generation. Between 1860 and 1890 the mortality from scarlatina sank from 0·983 to 0·246 per 1000, or as 4 : 1; from enteric fever from 0·850 to 0·180, or nearly 5 : 1; and from phthisis from 2·528 to 1·635, or 3 : 2. Yet the waste of infant life is still appalling, 18 or 20 of 100 born dying in the great manufacturing towns, and 15 in England generally in their first year against 9 or 10 in Ireland and in Norway. But since everyone will die sooner or later, a reduction of the deaths in one age-period must be compensated by an increase in another, and the consummation of preventive medicine would be attained when the whole mortality should be concentrated in the last decade of human life. Already the mean lifetime has been extended by four or five years, but fewer I believe attain to extreme old age than formerly. Patriarchal longevity requires patriarchal conditions and habits, and centenarians cannot be numerous in the present strain and struggle of life. But

"Better fifty years of Europe
Than a cycle of Cathay,"

and our end will have been achieved when nearly all shall survive far into the period of useful activity, and those who reach a good old age shall retain their faculties and energies to the last days of their lives, senile decrepitude and imbecility being no longer known.

The deaths of infants, of children under 5, and of persons over 60, if they are to be of smallest use, should never be calculated on the total population, or on the deaths at all ages, but on the number of persons living at that particular age, or in the case of infants under one year on that of the births in the year, and on it their mortality must always be calculated; but as to the others, unless the numbers living be known at least approximately, their special death-rates should be ignored.

The proportion which the number of old people bears to the total population is no indication of the general longevity, this factor being determined far more by the fertility of the marriages; thus if in three communities the average number of children to a marriage be three, four, and six respectively, supposing all adults to marry and making no allowance for deaths, the grand-parents in the third generation will be to their descendents as 1 to 5, 7, and 13. It is in this way that the French

have been erroneously credited with a greater general longevity than the English, solely on account of their smaller families.

Two examples of diseases incident to different periods of life will suffice to show the importance of taking into account the age-constitutions of communities in comparing either the absolute or the percentage mortalities from any particular cause; and this whether the differences in constitution be the results of higher and lower birth-rates, expectation of life, or of migration.

Scarlatina is, as all know, a disease of early life, more than 90 per cent. of the deaths being among children under 10 years of age. Now these form 25 per cent. of the population in London and Berlin, but only 12·4 per cent. of that of Paris. Equal death-rates from scarlatina would therefore imply a mortality in the French capital really twice as high as in the English and German, and the actual numbers per 1000 of the total population being 3·4 and 2·8, it follows that among like numbers of children, to 10 English or German no fewer than 23 French children die from this cause. Again, cancer is essentially a disease of advancing age, scarcely known among those who have not passed what Dante called *il mezzo del cammin di nostra vita*, or their 35th year, and nearly three times as fatal in the second as in the first of the decennia following; the natural result of an increase of proportion of individuals over 40 or 45 years of age, whether brought about by a reduction of the number of premature and preventable deaths, and consequent saving of life in the most active and productive period, which is the greatest success as yet attained by preventive and curative medicine, or by a falling birth-rate, which may be an indication of good or ill omen, according as it is prompted by proper prudence or by selfish motives and immoral habits—the natural result, I say, of such a change in the age-constitution of a population would be a great and progressive increase in the number of deaths, and in the death-rate for all ages from cancer, even though the incidence were no greater and the case mortality less.

The *natural increase of a population* depends not only on the number and fertility of the marriages, but on the age at which girls are married, for while it is doubtful whether, within certain limits, this makes much difference in the number of children to a marriage, it is clear that the rate of increase of the population will be influenced by the intervals between successive generations; thus if the average age at which the girls marry be 19, there will be 5, and if 24, then only 4 to a century, and the population will increase in like proportions, though all other conditions and factors be the same, recourse to artificial means for the limitation of families being uncalled for. If on

the other hand there is a great demand for population there is always a large reserve of marriageable and eligible persons of both sexes to be drawn on even to the extent of doubling the birth-rate.

In determining the fertility of women or the number of children to a family, the births should be calculated not on the number of marriages, but of women who have married, for the procreative period of the female being limited, a widow who marries again does not make a fresh start, but is in the same position, if still young, as she would have been had her first husband not died, and if old as if she had remained a widow.

More women than men marry, for second and third marriages are more frequent among men, and while widowers often marry spinsters, bachelors rarely marry widows.

The correspondence between the oscillations of the marriage and birth-rates is remarkable, considering that women once married continue to bear children for ten or more years, but I think that the explanation is to be found in the fact that while of married women in general one only in three or four gives birth to a child in each year, at least half of the newly married do so in the first year or two after marriage. We may compare with this the enormous rise of the birth-rate in Germany in the year following the Franco-German war, when nearly a million young men were drafted into civil life, and over half a million married men returned home to their wives in robust health after one or two years' separation.

The *comparative healthiness of occupations* is a question bristling with fallacies, and one respecting which extraordinary misconceptions prevail. There is no denying that, though individuals may be found enjoying good health and attaining old age under the most unfavourable conditions, many occupations are more or less unhealthy and tend to produce disease and premature decay. But the common practice of taking the mean age at death as an indication of the healthiness of an employment is delusive in the extreme, for in all classes of society there are some that for various reasons, as the bodily strength or mental activity required, or the remuneration given are followed by the young only, who in later life turn to other occupations; some positions to which men attain only after a long preparation, and others again for which elderly men of tried honesty and sobriety are preferred. No doubt the circumstances and mode of life of some professions and occupations are highly conducive to health and longevity, while those of others are unavoidably the reverse. But other factors must not be lost sight of. The longevity of bishops and judges is well known and that of pensioners is proverbial, but the

former are men who, having reached or passed middle life, are still vigorous in mind and body, and the latter, after long years of regular and industrious habits, enjoy freedom from further care and worry. Such men cannot die young, for there are no young men among them, and to say that judges, bishops, and generals attain greater ages than barristers, clergymen, and inferior officers, is merely to say that old men live longer than those who die young. It is puerile to infer, as Dr. Rohé does, the healthiness of their occupations from the mean age at death of sailors and of lighthouse keepers, of professors and of students, of merchants and of clerks, or to say that telegraph clerks and soldiers die mostly between twenty and thirty. The only proper method is that of Dr. Ogle, viz., to compare the death-rate per thousand living with that of the general population of the same age and sex.

Then there is the question of selection, the physical qualifications required determining to a great extent the choice of an employment, for only sturdy lads can be apprenticed as smiths or shipwrights, while the weakly must be put to tailoring or shoemaking; only sober men are accepted as engine drivers or railway guards, but anyone can be a cabman.

A like fallacy is involved in the assumption that married life is in itself more conducive to health and longevity than is celibacy. No doubt bachelors are more prone to irregular habits, but many persons of both sexes abstain from marriage on account of their ill health or physical defects, and are not unhealthy *because* they remain single. The influence of the marriage market on female labour and employment is such as to deprive the mean age at death of all significance, and even to falsify many conclusions drawn by Dr. Ogle's method, for very few women continue to follow the same occupation for the twenty years required, much less throughout their lives. Domestic servants, shop girls, and female clerks usually marry after a few years. Servants, especially, rarely die as such, and it is only as mill or factory hands that women to any great extent keep to the same work after marriage as before. I would not underrate the ill results of sedentary employment in overcrowded rooms, but I do believe that the very high mortality, especially from phthisis, among needle-women, &c., may be in large part explained by the removal through marriage of the healthier and comelier girls.

A very prevalent source of error in questions of this kind is the fallacy of ascribing to one particular cause, perhaps a real and powerful factor, but still only one among others not less powerful, the whole effect of a plurality of causes. The so-called "Temperance Advocates" are constantly appealing to

the notoriously high mortality among tavern keepers and their assistants as if it were wholly due to drink. But if shop attendants and work-women suffer from long hours and ill-ventilated rooms, the far longer hours spent in the fouler air of the bar, 'mid blazing gas-lights and an unwashed crowd, without even a weekly day of rest, cannot fail to have a worse effect on the health of these young persons even if they were total abstainers. In fact, while no one can doubt that publicans lead easier lives and are more given to indulgence in drink than barmaids and other tavern servants, the comparative mortalities of the two classes are calculated by Dr. Ogle as 1521 and 2205 respectively.

So, too, in determining, *e.g.*, the influence of heredity in the production of phthisis, of cancer or leprosy, or of a certain milk supply in the spread of a fever, much more than the mere concurrence or succession of two phenomena is required to prove their relation as cause and effect. In every such investigation the inductive methods of agreement, of difference, and of concomitant variations must be worked through, and the possibility of a plurality of causes should not be lost sight of.

Phthisis may for statistical and public health purposes be considered synonymous with pulmonary tuberculosis, for though there are several forms of phthisis, as chronic catarrhal and interstitial pneumonias, and that caused by the inhalation of irritative dusts, the pneumoconiasis of Hirt, the subjects of these become as a rule sooner or later tuberculous, tuberculosis being an infective disease set up by the invasion of the lymphatic vessels and glands by bacilli gaining access thereto through a mucous surface, the seat of some pre-existent catarrh or morbid state depriving it of the resistive power possessed by healthy surfaces, on which they speedily perish or are destroyed by phagocytes. The predisposing catarrhs are prevented by drying of the soil and dwelling, and by improved conditions of living generally, and the risk of infection by the better ventilation of houses and workshops, and the intelligent disposal of the sputa. The mortality from phthisis has been reduced during the present generation by 30 to 40 per cent., but some persons maintain that this is by no means an unmixed good, for they say it involves the preservation and perpetuation of a feeble race prone to other diseases, especially those of the nervous system, which the former high mortality from phthisis tended to eliminate. This I believe to be a fallacy, for such a doctrine would be true only if phthisis killed its victims before attaining the age of marriage, or incapacitated them from becoming the parents of families; whereas it does not in the majority of cases appear until they have reached that period of

RESOLUTIONS PASSED AT THE CONGRESS HELD AT BIRMINGHAM, 1898.

RECOMMENDATIONS MADE IN SECTION 1:—

"That this meeting beg to recommend to the Council of The Sanitary Institute, the advisability of memorializing the Educational Department with a view to including teaching of the outlines of hygiene in the obligatory subjects of compulsory education."

Decision of the Council.—It has been arranged to further discuss the subject at a Sessional Meeting to be held in April, when Miss Alice Ravenhill will read a paper on "Practical Hygiene Teaching in Elementary Schools."

"That the Council of The Sanitary Institute be recommended to represent in the proper quarters the necessity for Sanitary Authorities having at least the same powers in reference to the sanitary conditions of schools as to work-places."

Decision of the Council.—Having regard to recent decisions in the Courts, the Council are of opinion that the present legislation is sufficient for the purpose.

"That this meeting recommends the Council of the Institute to take such action as may best promote the following objects:—

"The introduction into Parliament at an early date of a Bill, giving effect to the recommendations of the Royal Commission on Tuberculosis.

"The immediate acquisition by Sanitary Authorities of powers similar to those contained in the Glasgow Police Amendment Act, 1890, Sections 24—27.

"The urgent desirability for all public institutions, hospitals, &c., especially those which are rate-aided, to obtain their milk supplies from herds guaranteed free from tuberculosis by a competent veterinary surgeon.

"The provision by the Minister of Agriculture (in conformity to the recommendation of the Royal Commission), of tuberculin and the services of a veterinary surgeon being supplied free of charge to all farmers desirous of freeing their stock from tuberculosis."

Decision of the Council.—These resolutions are still under consideration in connection with other questions arising out of the Report of the Royal Commission on Tuberculosis.

RECOMMENDATIONS MADE IN THE CONFERENCE OF MUNICIPAL REPRESENTATIVES:—

"That the Council of the Institute be recommended to urge upon the Government the necessity for legislation to secure the registration of ice cream vendors, and the sanitary control of places where ice cream is made."

calculated not on the average strength, but on the number of admissions in the year. Thus, in a hospital having 100 beds, where the average period of treatment was six weeks, 100 deaths in the year would represent a mortality of, not 100 per cent., but of 100 in 800, *i.e.*, 12½ per cent. But the circumstances of hospitals as regards the nature and gravity of the cases, the proportion of medical to surgical beds, the demand for admissions, and consequent length of time during which a patient is allowed to remain are so diverse that comparisons are rarely possible. Such differences I believe fully explain the alleged greater success, *i.e.*, lower case mortality in small provincial hospitals than in those of manufacturing and shipping towns as London, Liverpool, Birmingham and Glasgow, to say nothing of the reputation of the staffs attached to the latter which attracts grave cases from elsewhere.

The only legitimate comparisons are between those in which all conditions, save the one in question, are practically identical. Such perhaps would be maternity or fever hospitals where patients suffering in similar manners are retained till recovery or death; the same hospital in successive years or periods, and hospitals of the same character, situated in the same locality and among the same population. In such cases the results of the practice or the rejection of serumtherapy or antiseptic methods, the adoption of the pavilion system or the retention of the solid block, or other striking contrast may fairly be accepted as the determinant factor of markedly divergent mortalities.

THE CHAIRMAN (Prof. W. H. Corfield) said he was sure they would accord a hearty vote of thanks to Dr. Willoughby for his most interesting and important paper. It was a paper which could not be discussed from all points and in all its bearings, but he had no doubt that one would take up this portion and another that, so that they might have a good discussion. Dr. Willoughby's reference to demography reminded him that when the International Congress of Hygiene and Demography resolved to hold its session in London, in 1891, as acting secretary of that Congress, he could find no one who understood what the word demography meant. So he proposed to the Committee that they should call it the Congress of Hygiene and Statistics. But when the circulars were sent out with this title, such a hubbub was raised by the continental demographers, that the Committee had to alter the designation immediately. They reverted to the old title, but he had to put in the prospectus an explanation of the meaning of the word for the benefit of the English people, for the word was then practically unknown. He accordingly wrote to the leading demographers on the continent, asking each one for a definition of "Demography." Every one answered the letter, but

not one sent a definition. So he put in the circular that "Demography is the science which studies the social conditions of communities from statistical points of view." That was translated into three other languages and sent abroad, and, as no one complained of it, he presumed it met all the different views. It was a somewhat curious thing, but in 1879 he read a paper before the Congress of the Institute at Croydon on "Sanitary Fallacies," and now he was presiding at the reading of a paper on a kindred subject; they would, if they referred to that paper, see that he had given a few instances of statistical fallacies, and one had been, to a certain extent, alluded to by Dr. Willoughby, viz., that it was pointed out by Dr. Farr, a good many years ago, that the influence of immigration on the death-rate of a population was nothing like so great as was frequently made out. If you added the deaths of immigrants to the deaths in any community, you ought to increase the population by a reasonable amount, due not merely to the immigrants themselves, but to the other children who had been born at the same time and who had died before the age of the immigrants. He had been very much interested with Dr. Willoughby's remarks as to domestic servants being "immortal." That was a most happy illustration, and he was very thankful to him for it. It was perfectly true in the way Dr. Willoughby put it. In his own district he had very curious instances of it. St. George's, Hanover Square, used to be divided into three sub-postal districts,—Mayfair, Hanover Square, and Belgravia. He used to calculate out what he called the mean length of life—not by the life table method, but by Dr. Bristowe's formula—and that for Mayfair was generally between 90 and 100; but when it came to between 100 and 105 as the mean duration of life for the population of Mayfair, he had to drop it. This result was due entirely to the "immortals." Since that time the Registrar-General had combined Mayfair and Hanover Square, so that he could revert to his former proceeding without the results looking so ridiculous as they would have done otherwise.

Mr. Noel Humphreys (London) remarked that the paper, which was a useful one, and one which Medical Officers of Health who had to study the incidence of vital statistics, would appreciate, stated a number of obvious and uncontrovertible facts which scarcely admitted of discussion. In the first place Dr. Willoughby's paper ought to lead people to adopt greater precision in the use of terms, especially the term death-rate, which was very frequently used in an incorrect and misleading manner with regard to statistics, and he thought the Institute might do useful work in calling attention to this. Passing to the more general subject, Mr. Humphreys said that he was sure that all Medical Officers of Health would admit that the crux of the difficulty with which they had to contend was the estimate of the population. With regard to that subject, he thought the Sanitary Institute, as the period when another census would be taken up was approaching, might possibly aid sanitary science and public health generally by using its influence to impress upon the Government the absolute necessity, if health statistics are to have the value and utility

they ought to have, of instituting a quinquennial census. The London census in 1896 was the first example of a quinquennial census in England. It was brought about accidentally under the Equalisation of Rates Act. That Act combined two very important improvements in census taking, it provided an intermediate census, and it also imposed upon the local sanitary authorities the obligation to furnish annually the number of inhabited houses on the Rate books within each district. The latter information is of the greatest value in revising the estimates of population in intercensal periods, and he much hoped that the Sanitary Institute would use its influence in promoting a census Act, which would provide for a quinquennial census and an annual return of inhabited houses from each sanitary authority throughout the country. The only other matter he would refer to was one which he thought Medical Officers of Health would admit was of great importance, namely, the question of areas. When registration was established sixty years ago, the Poor Law Union was necessarily made the unit for registration purposes. Unfortunately the Registration Act compelled the continued use of that unit, which had many obvious objections. But fortunately there were signs now of a great desire throughout the country to assimilate registration areas with the Poor Law areas, and to alter the registration districts wherever possible, so that they could be made to agree with the sanitary districts themselves. These points were, in his opinion, of the first importance to sanitary statistics, and he hoped the Sanitary Institute would see its way to support improvements in this direction.

Dr. E. W. Hope (Liverpool) said that Dr. Willoughby's paper was to him most interesting and refreshing. The new ways in which he had presented old facts, and the many new considerations he had given, afforded for them something to carry away and think about. He said, statistics might be made to prove anything, so might words. If people put words to wrong uses that was no reason why the use of words should be discredited, so with vital statistics. He did not propose to follow Dr. Willoughby through the intricacies of his interesting paper, but he did wish to draw attention to one or two points which were alluded to in it. One of these had already been referred to by Mr. Humphreys, and it was certainly one which most concerned Medical Officers of Health, viz., the necessity for an accurate basis. The whole of their subject bristled with possible fallacies, and therefore it became the more essential that the groundwork or basis of their calculations should be correct. Now, they had every reason at the present time to believe that their basis was incorrect. He spoke with deference in the presence of such eminent statisticians as Mr. Noel Humphreys, but he thought that that gentleman would agree with him that the probability is that the Registrar General did not estimate one single large town correctly. Week after week it was carefully set forth in the newspapers that the death-rate of this place is so much, and the death-rate of that place something else. The places were all strung together without

comment for comparison, and when enquiries were made as to the basis of the calculations confidence was rudely shaken. Those most qualified to judge did not consider that the basis of those calculations at all approached accuracy. He had written to the Medical Officers of Health of most of the large towns, asking (1) whether or not they considered their population was estimated correctly, and (2) that if they considered the estimate was incorrect, did they consider the error great enough to vitiate the returns which were published by the Registrar General? Some of the replies were as follows: Birmingham, the returns are incorrect by many thousands; Newcastle, West Ham, Manchester, Salford, all considered the returns incorrect, and that the weekly returns are erroneous; Brighton and Nottingham are doubtful, although they added that the system is unsatisfactory; Hull, not correct according to the opinion of the Medical Officer of Health; Bradford, not correct; Gateshead, Derby, Huddersfield, Blackburn, Norwich, Plymouth, and Sunderland, all said that the error is great enough to vitiate the returns which were published weekly by the Registrar General. Other towns were Oldham, not correct; Halifax, doubtful; Burnley is not satisfied as to the Registrar General's returns, and had long since fallen back upon making its own estimate; Sheffield considered that the error is between 30,000 and 40,000; Portsmouth had a similar opinion, while Wolverhampton and Birkenhead also expressed the view that the Registrar General's estimate is incorrect. It would be seen that most of the large towns were included in that list. Now, with regard to Liverpool, which had been referred to by Dr. Willoughby, he should like to say that at the last census the Registrar General's estimate of the population of that city was 100,000 in error. It seemed almost incredible that year after year so egregious and gross an error could have gone on without some investigation or check. But what is the position to-day? The population of Liverpool is estimated by the Registrar General to be 633,000, and the increase since the last census is estimated to be 4,200. On making a special census of the inhabited houses by qualified persons, acting under special instructions—each one of the 400 persons employed having a book with instructions as to how to take the number of empty houses there were in each street—it was found that there were upwards of 13,000 inhabited houses more than there were in the last census. Surely that conflicted with the Registrar General's estimate that there were only 4,000 more people in Liverpool; if there were 13,000 inhabited houses where did the people who lived in them come from? Again, they found that the number of registered voters since the last census, including the extended area, had increased by 26,000. Now, voters could not put their own names on the lists, very few of them presumably could be bogus voters, for claims were closely criticised before the revising barrister by the opposing political agents. Those 26,000 voters did not exist in the imagination. These seemed to him strong grounds for asking the Registrar General to consider the desirability of revising his estimate of the population of Liverpool, but he had not seen his way to act upon the suggestion. Naturally

the question was a thorny one, as had been pointed out on his behalf; for if it were done for one town it would have to be done for another. But what was to be particularly complained of was the publication every week, in an official form, with the weight and authority of a Government Department, of statistics, which in all probability were not only inaccurate, but which were grossly inaccurate and misleading. It might be asked, what does it matter whether they are right or whether they are wrong? It mattered a great deal. For one of the means by which sanitary progress could be gauged was the reduction, or otherwise, in the death-rate and the rate of sickness. A district was found to be notoriously unhealthy, the unhealthy areas were removed, wide streets were constructed, workmen's dwellings of the most approved style erected at enormous cost, provision was made for the infective sick, the water-supply was improved, scavenging increased, and what was the result? The death-rate was going up by leaps and bounds according to the Registrar General. Now a Councillor who took an interest in his city naturally looked for some reward for his pains and for the public money spent, and it certainly was discouraging to find this apparently anomalous result. Some persons perhaps are not actuated with the desire to advance the public good, and they were only too glad to have an occasion to turn round and say sanitarians were wrong, and point to the Registrar General's returns, which they say would not be published unless they were correct, for he had means at his disposal which the local officers have not. Well, he ventured to think that these matters were not properly considered, and that the basis needed revision, and he would like to go a step further than Mr. Humphreys, with regard to the means by which the Sanitary Institute could advance the object they had in view, and that was to propose a resolution to the effect that in the opinion of that meeting a more frequent census is necessary. He failed to see that anything but good could result from that. In Germany the census was quinquennial, and in Holland he believed that it was still more frequent, though he did not know what it was in France and other countries. But in Japan a most careful method was adopted, which meant practically that an annual census was taken. Japan had taken the lead in many matters, and it had certainly taken the lead in this. In fixing upon this one point which so nearly concerned Medical Officers of Health, he should not like to be understood to have a less appreciation of other important points that Dr. Willoughby had carefully brought out. All who had listened to him, especially those who had given some previous attention to the subject, would benefit by his paper; meanwhile, if in order, he should like to move "That in the opinion of this Sessional Meeting of the Members of The Sanitary Institute, it is desirable that a quinquennial census enumeration of the population of the whole country should be taken, in order to ensure greater accuracy in statistics relating to the public health."

Mr. Noel Humphreys (London) said he should like very heartily to second Dr. Hope's proposition. It should, however, be remembered

that the Registrar General really made no estimate of population, he did not pretend to do so; it was quite out of his power to make an estimate of a local population. In all his returns it was stated clearly that "if the population has increased during the current decade as it increased during the preceding decade," that the population would be so much, and if the population is so much, that the death-rate would be so much. During the decade 1881–90, an attempt was made to get from the municipal authorities of many large towns, information as to the number of inhabited houses on the rate-books. That application was made to the Town Council of Liverpool, and they refused to give any assistance on the matter, apparently because the usual hypothesis was obviously overstating the population and understating the death-rate. The Registrar General was thus baffled in his attempt to get the assistance of the local authority at that time, consequently the result at the end of the period was the excessive population to which Dr. Hope had called attention. In seconding the proposition, he should like to add to it as an addendum, "and that, at the same time, the Act should specify that every local authority shall furnish to the Registrar General the number of inhabited houses on the rate-books annually." If that information were given the Registrar General would have some basis upon which to revise the population, and really to estimate the population of a town. Without that information they would have to trust to a quinquennial census, and even five years was too long for calculating the population of towns of rapid growth.

Dr. HOPE's motion was then agreed to *nem. con.*

Mr. NOEL HUMPHREYS moved, and Dr. Bond seconded, "That in the opinion of this Sessional Meeting of the Members of The Sanitary Institute, in the Census Act provision should be made for an annual return of inhabited houses on the rate-books, by the municipal authorities of towns."

This was agreed to *nem. con.*, and it was further resolved to request the Council of the Institute to bring the resolutions before the Government in such way as they may think fit.

Dr. W. A. BOND (London) said that he would mention one point in regard to deaths in outlying public institutions. As a metropolitan Medical Officer of Health, he found there was a number of persons who after having been only a short time in the district went to workhouses, infirmaries, or hospitals, and their deaths were returned as belonging to that district. He thought there ought to be some limit of time in regard to which such deaths should be included in the local returns.

Dr. SYMONS (M.O.H., Bath) said he should like to ask Dr. Willoughby if he could suggest any means of correcting for the proportion of the "immortals." In Bath, with a population of 52,000, they had 600 servants, probably a larger proportion of servants than any other large town; and he quite agreed with Dr.

Willoughby as to their influence on vital statistics, this influence ought to be allowed for if possible. With regard to the census, he should like to know if information concerning the house or street population was kept. In Scotland, he had been informed, particulars concerning each street could be obtained by the local authority at the time the census was taken.

Mr. A. S. E. ACKERMANN (London) remarked with regard to the statement, "statistics may be made to prove anything," that it ought to read "statistics may *apparently* be made to prove anything;" because figures cannot alter facts, and if statistics were fraudulently manipulated they did not *prove* anything. Dr. Willoughby's remarks with regard to the unhealthiness of occupations reminded him of the argument often used by anti-teetotallers, who were so fond of pointing to the great ages attained by their grandfathers, ignoring the vast majority who died off, leaving the few pinacles to which they so proudly point. Something similar occurred later on in the paper, when Dr. Willoughby referred to the arguments of temperance advocates, based on the high rate of mortality among tavern keepers and their assistants. But although the tavern proprietor could not be said to be over-worked, yet he was extremely well clothed and fed, and was not exposed to other unhealthy occupations, as were many total abstainers, yet the death-rate among tavern keepers was excessive high. In the "United Kingdom Temperance and General Providence Institution," the deaths in the temperance section only realised 70 per cent. of the expected deaths, whereas 95 per cent. of the expected deaths actually occurred in the general section, which was composed of strictly so-called moderate drinkers, hotel keepers and their servants, and were not insured by this institution at all.

Dr. E. F. WILLOUGHBY, in acknowledgment expressed his gratification with the whole tone of the discussion, and his appreciation of Mr. Noel Humphreys' criticisms. Many of Dr. Hope's remarks reminded him of John Stuart Mill's amusing description of the way in which we, so soon as a want was felt sufficiently urgent to call for legislation, created a new authority, with a new district, with a new constituency and suffrage, with new rating powers and a new staff of officials until the conflict and overlapping of the several authorities resulted in a state of administrative chaos. He feared that he could not help Dr. Symons, except by suggesting that at the next census he should obtain copies of the enumerators' tables, and having ascertained the number and ages of all domestic servants, born elsewhere than in Bath, and the percentage that such persons bore to the total number living in each age period, he could make a corresponding deduction from all subsequent estimates of the population. The death-rate thus obtained would be very instructive, though it would not receive official recognition.

LECTURES AND DEMONSTRATIONS TO SANITARY OFFICERS.

INTRODUCTORY ADDRESS

TO THE TWENTY-SIXTH COURSE

BY SIR DOUGLAS GALTON, K.C.B., D.C.L., LL.D., F.R.S.

(VICE PRESIDENT.)

Delivered October 17th, 1898.

I ACCEPTED the duty of delivering this inaugural lecture because the occasion is an important one for the Sanitary Institute.

I must in the first place give you a short historical *résumé* of the causes which led to the formation of The Sanitary Institute, and the establishment by them of Examinations for Sanitary Inspectors and others.

The Public Health Act of 1875 was the first effort which the legislature made to deal with the health of the country as a whole, and that Act has been supplemented by numerous other Acts of Parliament as well as by Bye-laws.

This legislation recognized that whenever people congregate together in towns or villages, their tendency is to pollute air, soil, and water, unless very strict regulations are made and enforced to prevent one person from doing things which will injure his neighbour; and by the formation of sanitary districts, the Act created an administrative machinery for remedying sanitary defects.

In urban districts, the Medical Officer of Health, and the town or borough Surveyor are the chief executive officers responsible for the sanitary supervision of the district. In rural districts the chief executive supervisor is the Medical Officer of Health.

But the Sanitary Inspector is the agency through which the sanitary authority becomes acquainted with the detailed sanitary wants of the district, and on whose vigilance the sanitary authority must rely for securing the detailed application of remedies.

For these reasons the Sanitary Inspectors require a knowledge of the laws which control sanitary administration, of the

principles which govern sanitation, and of the methods which have been devised to give effect to those principles.

This knowledge relates to drainage, scavenging, and water supply; the control and improvement of the dwellings and lodgings of the poorer classes; the removal of sources of impurity from within and from the vicinity of dwellings; the restriction of offensive trades; the sale of unsound or adulterated food; and the power to deal with that most important subject, namely, the spread of infectious and epidemic diseases.

Soon after the passing of the Act of 1875, the Sanitary Institute was formed with the object of fostering sanitary knowledge, and of diffusing throughout the community a knowledge of the principles of sanitation.

It proposed to effect this object partly by holding Examinations in Sanitary Science, and granting Certificates of competency to Local Surveyors, to Inspectors of Nuisances and others charged with the administration of the Public Health Act, and to disseminate sanitary knowledge over the country; by holding Congresses in different localities, where opportunities would be afforded for the discussion of sanitary problems by sanitary authorities, medical officers, and others charged with the supervision of sanitation under the Act; and by arranging to make an Exhibition of Sanitary Appliances an integral part of its Congress.

At an early date in its career it associated itself with the Parkes Museum of Hygiene.

The Parkes Museum had been established in memory of Dr. Parkes' admirable teaching of the science of Hygiene, and was intended to illustrate :—

(1) Engineering and local hygiene, including climatology, and causes of disease and death-rates appertaining to physical geography; information on health resorts; botanical hygiene; geology as bearing on salubrity and water supply; plans for the healthy arrangement of towns; principles of town drainage, water supply, scavenging, and disposal of refuse, &c.

(2) Architecture.

(*a*) Designs and models connected with health in dwellings of every sort, factories, workshops, schools, &c.

(*b*) Materials and details of construction.

(3) Household requisites, including fixtures and furniture, and embracing all matters connected with lighting, warming, cooking, cleaning, and other domestic sanitary purposes.

(4) Clothing, embracing materials, shape, climatic influences, &c.

(5) Food: the chemistry of food as obtained either from the

animal or from the vegetable kingdom; and the relative nutritive value of different kinds of food. Beverages, dietaries, adulteration, diseases of plants or animals affecting the use of food, and so forth.

(6) Preservation and relief.

(*a*) Personal hygiene.

(*b*) Protection and rescue, including protection against disease, poison, dangerous insects. Life-boats, fire-escapes, lightning conductors, &c.

(*c*) Industrial pathology, or the prevention of accidents, injuries, and diseases incidental to industrial employments.

(*d*) Special hygiene of professional occupations.

You will thus see that the subjects which our Institute would illustrate are spread over the principal proceedings of our daily life.

The Parkes Museum possessed a valuable library of works on hygiene, which we have added to and made available for students.

The Exhibitions held at the Congresses afford an unrivalled opportunity of keeping the Museum absolutely up to date.

The awards given at the Exhibition are settled by means of a most careful system of judging the exhibits, which gives stability to its Court of Judges, accompanied by the practical testing of those exhibits whose merit cannot otherwise be determined.

The Examinations revealed the fact that there was no machinery available for acquiring the theoretical and practical knowledge necessary for passing these Examinations, and consequently the Institute established the important and very valuable courses of lectures and demonstrations in connection with the Museum, with which you are all familiar.

You will thus see that one of the first problems which occupied the attention of the Founders of The Sanitary Institute was to improve the knowledge, and through that the status of Sanitary Inspectors.

With this object The Sanitary Institute has through many difficulties, during a course of more than twenty years, laboured to perfect its system of examinations, of lectures and demonstrations, and its Museum and Library.

By means of these long continued exertions, we finally compelled the country and the Government to recognize the importance, indeed the necessity, of these Examinations.

The first result of this recognition has been that in the Public Health Act, London, 1891, Parliament has required that

Sanitary Inspectors shall possess a Certificate of competency for the performance of their duties, from some Examining body approved by the Local Government Board.

The syllabus of the courses of lectures, supplemented by inspections and demonstrations established by The Sanitary Institute, is before you.

This syllabus is founded simply upon what Parliament requires Sanitary Inspectors to know. You will see that it embraces a wide field.

But the most astonishing fact connected with this recent legislation of Parliament is, that whilst the Sanitary Inspector is required to possess considerable knowledge and technical skill, he is nowhere protected either as to his emoluments, or as to the tenure of his office.

In order that you may appreciate the importance of paying careful attention to the lectures and demonstrations, not only as a means of passing the examination, but because of the importance of mastering the knowledge they convey to you for use in after life, I will draw your attention to what the Sanitary Inspector is expected to know, if he is to carry out his duties properly.

The duties of Sanitary Inspectors have been defined by the Local Government Board briefly as follows:—

I. They are to obey the directions of the sanitary authority and of the Medical Officer of Health, and they are to attend the meetings of the sanitary authority when required.

II. They are to inspect their district systematically, and keep themselves informed of the sanitary condition of their district; and whenever they receive notice of the existence of a nuisance, or of a breach of the bye-laws or of the regulations made by the sanitary authority, they are to inspect and report thereon to the sanitary authority, as well as upon any noxious or offensive trades established in the district: they have to see that the provisions of the Common Lodging Houses Act are duly carried out: and under the Housing of the Working Classes Act they may be called upon to ascertain whether any dwelling-house is in a state so injurious to health as not to be fit for human habitation.

III. They are to report to the sanitary authority when the water supply for domestic purposes is either wasted, polluted, or defective.

IV. They are to inspect slaughter-houses and all shops and markets for the sale of butchers' meat, poultry, fish, fruit, vegetables, corn, bread, flour, or milk; and they are to cause any such articles as may appear to be unfit for food, but which are intended for the food of man, to be dealt with by a Justice

of the Peac subject to the opinion of the Medical Officer of Health.

V. They are to collect samples of food and drugs when necessary, and to take such further proceedings in respect thereof as may be required under the Sale of Food and Drugs Act.

VI. They are to give immediate notice to the Medical Officer of Health of the appearance of any contagious, or infectious, or epidemic disease. They are to take necessary measures under the direction of the Medical Officer of Health for preventing the spread of such diseases; and when it appears to them that the intervention of such Officer is necessary, in consequence of the existence of any nuisance injurious to health, or of any over-crowding, or otherwise, they are forthwith to inform the Medical Officer of He

VII. They are to be o superintend the execution of works for the suppre isances, ordered by the sanitary authority, and to see that have been duly executed.

VIII. They are to ke d of the sanitary condition of houses, in respect of tion has had to be taken under the Public Health 875, as well as to keep such other systematic records uired by the sanitary authority; and they are to re n all matters to the Medical Officer of Health.

You will see by this sum at the Sanitary Inspector is intended to be the eye and nd of the Medical Officer of Health; and it is only by keeping himself fully informed of the sanitary state of every part of his district, that he can bring to the notice of the Medical Officer all matters injurious to health in the district.

When I have advocated the importance of Sanitary Inspectors possessing a certain amount of technical education, I have often been met with the remark, that all that a Sanitary Inspector requires is common sense. Now common sense is a rare but most useful quality to possess, and combined with experience, common sense will go far to make up for want of special knowledge; but the duties laid on the Sanitary Inspector are wide, and since he has to keep the Medical Officer informed of any shortcomings in sanitation which occur in his district, he must possess special knowledge of the points which he has to observe, and upon which he has to report to his chief.

Let us consider for a moment what is the special knowledge which the proper performance of the duties of a Sanitary Inspector involves.

He requires a knowledge of the laws which control sanitary administration; he requires a knowledge of the principles which govern sanitation; and he must be conversant with the methods

which have been devised to give effect to those principles. Now this knowledge covers a very large field, and I purpose to explain briefly what it implies.

I. In the first place his general education must be such as to enable him to keep accurate records, and make reports, accompanied, if necessary, with sketches illustrating such reports.

II. He requires an accurate knowledge of the numerous Acts of Parliament which confer his duties upon him, as well as a knowledge of the bye-laws of the Local Government Board.

III. He must have a knowledge of the conditions which affect the health of dwellings, and must be cognisant of the various questions connected therewith, such as :—

(a) Overcrowding; and he must be able to measure and calculate the cubic and floor space in rooms.

(b) He must understand the principles of ventilation, and know simple methods for applying these principles to houses.

(c) He must have a general knowledge of the constructional conditions affecting warmth, that is to say, both in respect of the generation and distribution of heat in the most favourable manner, as well as in respect of the methods of construction which prevent the loss of heat.

(d) He must understand construction as bearing upon light and window space, and the proportion which window space should bear to floor space and cubic space.

(e) He should be conversant with the conditions which foster damp, and with methods for preventing damp and dry rot.

(f) He must have a knowledge of the general conditions required for good drainage; he must be able to apply simple methods for testing drains.

(g) He must be able to advise upon the best forms of sanitary fittings and appliances, and understand how to test them effectually.

This knowledge involves a certain acquaintance with details of building construction, and a knowledge of what constitutes good plumbing.

IV. He must possess some knowledge of the physical characteristics of good drinking water, and of the various ways in which water may be polluted, either in consequence of the position of wells and streams in relation to nuisances, or by other sources of injury, either to the sources of supply, or from the retention of water in cisterns and in houses; and he must be acquainted with the means of preventing pollution of water.

V. He should understand the conditions to be observed in

the construction and maintenance of dairies, cow-sheds, and slaughter-houses, so as to avoid sanitary dangers.

VI. He should be able to report upon noxious and offensive trades, and manufactures, and whether the operations of the trade are carried on under due regulation.

VII. He should understand the best and most efficient method of scavenging, and be able to advise upon the storage and disposal of refuse.

VIII. He is also bound to know the general characteristics of good and bad food (such as meat, fish, milk, vegetables, etc.) as well as to understand the duties assigned to him under the Sale of Food and Drugs Act.

IX. He has, further, to possess a knowledge of the regulations affecting persons suffering from infectious diseases; he must be acquainted with the use and value of disinfectants, and he must be able to apply the various methods of disinfection suited to the circumstance of each case.

This brief statement of the various matters with which the Inspectors must be cognisant, if they are to perform their duties efficiently, abundantly shows that they must possess a certain amount of technical knowledge, and this is not to obtained without special training; hence you will easily understand that something more than mere common sense is want[illegible] No doubt in many of these matters the Sanitary Inspector [illegible] at hand the advice and assistance of the Medical Officer [illegible] Health; but if he is to be an efficient help to the officer, an[illegible] his advice is to be of value and to carry weight with the hou[illegible] holder, he must himself possess a large amount of this techn[illegible] knowledge, the heads of which I have enumerated.

For instance, in the matter of sanitary appliances, Sani[illegible] Inspectors should know the reasons which have led to [illegible] adoption of the various appliances for sanitation, because [illegible] may sometimes by advising remedies for one insanitary co[illegible] tion, introduce, through want of such knowledge, fresh u[illegible] seen causes of disease.

As an illustration of this I would mention that when, [illegible] fifty or sixty years ago, the evils of cess-pits in towns [illegible] seen to be very great, the proposal was made to tu[illegible] privies into water-closets, and to send this refuse a[illegible] the sewers; but although, until then, the sewers ha[illegible] been constructed in a manner suitable for removing rain [illegible] and had been only allowed to be so used, no one [illegible] at that time whether the actual condition of the sew[illegible] such as to permit of their being efficient carriers of [illegible] of refuse, nor was any thought given to probable ev[illegible] sewer gas, and many deaths resulted from this ig[illegible] Indeed, I know more than one case where the water-[illegible]

pipe was led into the rain water pipe, which was connected with a water cistern under the house; the contamination of which caused much disease and some deaths. You cannot make a new departure in sanitary progress without much careful consideration, for each step you take introduces fresh conditions; this of itself is an evidence that it is highly important that the Sanitary Inspector should have sufficient knowledge of the principles of sanitation to enable him to appreciate these new conditions.

At the present time, one of the most important functions of the Sanitary Inspector is with reference to infectious and contagious disease. The Public Health Act of 1875 authorises the local sanitary authority to provide hospitals and places for disinfection of bedding, clothing, etc., as well as ambulance carriages for the conveyance of sick persons. Recent Acts of Parliament enable sanitary authorities to require the notification of infectious diseases, and to isolate patients suffering from such diseases, as well as to pay the lodging of persons who must vacate their houses during the disinfection of the house and premises where a case has occured.

I will give you an instance of the efficiency of isolation, and how the efficiency can be marred by the neglect of necessary precautions.

You all know that the anti-vaccination cry has been very rampant lately.

It is scarcely necessary for me to tell you that vaccination properly practised with good lymph is, when accompanied a few years later by re-vaccination, an almost absolute protection against small-pox.

In Germany every child is vaccinated. The German Army, which enforces vaccination and re-vaccination, is entirely free from small-pox.

In this country many towns have very imprudently repudiated vaccination, one of those towns was Gloucester, near which place Jenner's wonderful discovery took its rise.

You will remember that last year that town suffered from a dreadful visitation of small-pox. Then when too late every one endeavoured to resort to vaccination.

Let me contrast with the epidemic at Gloucester, the condition of another town, which also has foolishly repudiated vaccination, namely, Leicester.

You all, no doubt, know that the people of Leicester are much opposed to vaccination, and that a considerable proportion of the population is not vaccinated. They have, however, managed to escape during a long series of years from the ravages of small-pox, whilst epidemics of small-pox have occurred in

their vicinity, and indeed have raged in many towns and country districts of England.

Leicester has obtained this immunity by paying very careful attention to the general sanitation of their town, and especially by maintaining a very efficient isolation in all cases where the disease manifests itself. They have an isolation hospital, to which anyone attacked with small-pox is removed unless adequate isolation can be afforded at home; and they isolate not only the patient, but they place in quarantine the family who have been in contact with the patient; they pay the wages, and keep them isolated under supervision for a sufficient period, to ascertain that they do not develop small-pox.

Moreover, they do recognize the advantages of vaccination, in that they endeavour to induce all such persons and their attendants to submit to vaccination.

I will give you another instance. Vaccination has been very perfunctorily enforced in London.

We had a very serious epidemic of small-pox in London in 1884–5. According to the usual course of past epidemics of small-pox it should have recurred between 1889 and 1891, or 1892, and again between that period and 1898. But every case of small-pox in London which cannot be isolated effectually in the patient's own dwelling, is removed by ambulance carriages and steamers to ships placed in the lower Thames, and up to the present time the epidemic tendency has been kept under. There occurred however, some five or six years ago, a sudden outbreak of some ten or twelve cases, which afford a striking instance of how failure to isolate a patient may easily lead to a spread of the disease. The cases were all traced to one man who had fallen ill soon after landing from a foreign ship. His illness had not been recognised at once, and he had remained in his lodgings for some days before the case was notified, and before his removal to the hospital ship. The other cases were all traced to have had communication with this man or his surroundings, under circumstances which showed that if he had been removed at once probably all the others would have escaped the disease.

Inasmuch, however, as vaccination and re-vaccination afford an almost complete immunity from small-pox, the majority in this country wisely prefer the absolute safeguard of universal vaccination, to the risk of small-pox, which Leicester incurs; but we may learn from the Leicester practice in regard to small-pox, how to treat other infectious diseases, and by taking steps to isolate immediately every case of infectious disease, arrive at almost stamping them out. I would, however, add that the real objections to vaccination have arisen, either from

impurity in the lymph and the conveyance of some disease from one child to another, or to some carelessness in the operation.

But these are evils which might be avoided with care.

You must also remember that one of the conditions necessary to make isolation effective, is the careful, immediate disinfection of premises, furniture, and clothing. Now this is especially the duty of the Sanitary Inspector. He must, therefore, possess adequate knowledge of the various materials to be used in disinfection, and how to apply them; he must also be furnished with adequate appliances for disinfection. It cannot be too strongly urged that, if the notification of infectious disease is to be really effective as an instrument for preventing the spread of disease, careful immediate isolation and disinfection is imperative.

The watchword of the sanitarian is, pure air, pure soil, pure water. In our large towns the purity of air is much neglected. The impurities in town air arise partly from the decomposition of the organic matter, thrown off in the processes of life, partly from the coal carelessly burnt, both in our domestic fire-places and in manufactories, a large portion of which is carried unconsumed to float in the atmosphere as dust.

Let me briefly explain the effects of dust in the atmosphere. Where watery vapour condenses in the atmosphere it always does so on some solid nucleus; particles of dust floating in the air are very convenient nuclei on which it can condense, and when it does so it forms visible fog.

If there was no dust in the air there would be no fogs, no clouds, no mists. But dust pervades the air everywhere. The haze in the air on a summer's day is caused by dust, which is probably largely composed of the pollen of flowers.

In town air, in addition to the organic matter from houses, from stables, from horse manure in the streets, and from gaseous products of combustion, the air is filled with particles of dust, with soot, and also with tarry matter, which coats the particles of aqueous vapour condensed upon the dust particles on a foggy day and prevents their dissipation, and thus town fogs are more persistent than country fogs.

Hence, smoke and fog act and re-act on each other to keep the atmosphere polluted. Rain partially cleans air from dust, and the air in a town is made distinctly purer by a heavy shower of rain.

If the atmosphere of a town were stagnant, the continuous emanations of impurity into the air in large towns would soon render existence impossible.

But air is always in movement. This movement arises from perpetual changes of temperature on the surface of the globe—

changes which are the causes of all our winds and hurricanes. The average movement of the atmosphere in England is at the rate of about twelve miles an hour. On the very calmest day it rarely moves less rapidly than five or six miles an hour. Therefore, in a town, the streets should be so laid out as to encourage the free movement of air round the buildings.

There is another point on which, I think, I can usefully say a few words, that is on the disposal of household refuse. This subject is indeed one of growing importance, for our population increases rapidly, and the refuse which has to be disposed of increases in proportion. This refuse consists of

1st, fœcal matter;
2nd, of house slops; and
3rd, ashes, kitchen waste, and other household refuse.

In country districts, where houses are separate, the utilization of these matters is comparatively simple. They can generally be utilized without sanitary danger, in increasing the fertility of the garden and the field. But where houses are close together, as is the case in large villages and in towns, the difficulties are greater. You will hear in the course of these lectures what are the most effectual modes of disposing of these matters. I would only observe that the refuse, on sanitary grounds, ought never to be allowed to remain long in the house itself, nor ought it to be accumulated near the house, either in heaps where it contributes to pollute the air, or in pits where it may contribute to pollute the wells. The only safe plan is to place it in a metal receptacle and to have it removed to a distance, for purposes of utilization, every morning. In the final disposal of town refuse, it has sometimes been the custom to adopt very unsanitary proceedings. In the vicinity of many large towns this refuse has been sometimes used as the means of raising the level of the ground to afford a foundation for new houses. The continued rising of vapour from the ground makes this a most dangerous proceeding, and fevers and other diseases have been thereby occasioned in the dwellings built on such a foundation. This method of disposal is now fortunately comparatively rare.

The process of dust sorting by hand, which is still to some extent practised, is an insanitary occupation, and a large number of towns resort to destruction by fire as the simplest method of getting rid of it. Where refuse is burnt without smell the method is not insanitary; it saves trouble, and the refuse affords a fuel which may be utilized to assist in driving engines to make electric light, or otherwise.

But there is another important matter under the cognizance of the Sanitary Inspector, and that is the contamination of

food. This arises partly from diseases in live animals which furnish our milk and meat; partly to the deleterious adulteration with which the grocer, the baker, the publican, the wine and spirit merchant and others find it advantageous to qualify our food; partly to the positions in which food supplies are kept, and in which the food may imbibe some noxious matters.

A perusal of the syllabus of the lectures will show you how large is the number of details of which practical sanitation is made up. All these details have had to be worked out by the researches of the Chemist, the Physicist, the Physiologist, the Engineer, and the Agriculturist. It is through these various sciences that we are daily acquiring a wider knowledge and control of the intricate influences which affect our health. The Chemist explains to us the quality of air, whether on the mountain, in the fields, in towns, or in your houses, whilst the Physicist shows us how to control its movements; and together they are opening to our view new possibilities of counteracting deleterious surroundings.

On the other hand, the Physiologist is showing us not only that minute organisms pervade all nature and assist in many of its operations, but he is classifying them according to their good and bad characters, and is learning to control their tendencies for evil, and to develop their useful qualities as general scavengers, so as to render our sewage innocuous.

You will see from this summary that in order to deal intelligently with these apparently small matters, the Sanitary Inspector must possess a very considerable amount of technical knowledge, and each year these requirements are increasing. Now, although one of the chief functions of the Sanitary Inspector is to give attention to these apparently small causes, in order to bring them to the notice of the Medical Officer of Health, and thus assist in preventing the spread of the disease, you are all aware that if a house and its surroundings are to be kept in a healthy condition, it must be so kept by those who live in the house, that is to say, by the householder himself. But the householder is often careless about such matters; more frequently indeed he is not aware of the evils which defective sanitation entails on himself and on his neighbours. The Sanitary Inspector is, however, or should be, always at hand to point out the requirements of sanitation to the householder when he is careless, and to teach him these requirements when he is ignorant of them. In carrying out the duty of explaining his shortcomings to the householder something more than mere knowledge is required. If he is to spread the cause of sanitation efficiently he requires eminent tact.

There are two ways of approaching people under an Act of

Parliament. One way is to threaten legal proceedings, and to order things to be done without explaining the object of the work required. That is a very injudicious way. It hinders rather than advances sanitation. The other way is to use the position of a Sanitary Inspector as a means of teaching people and educating them in sanitary methods, so as to make them understand that they thereby diminish the causes which lead to infectious disease. That is the true way to insure proper attention to the subject. It is far better for people to do the work of sanitation willingly, and look upon the Sanitary Inspector as their friend, than to regard sanitation in a hostile spirit, and look on the Sanitary Inspector as a prying, intolerant autocrat, who would force upon them the principles of sanitation, whether or not they like and understand them.

I do not think that I can impress upon you too strongly that all sanitation depends very largely upon care in details, which must be looked after by the individuals among the public; and therefore that our sanitary progress depends upon the recognition by the public, that sanitation is desirable and necessary.

If you look into the Bible you will see that Moses included his sanitary precepts as a part of the religion of the people, and that he committed the duty of enforcing sanitary regulations to the care of the priests, and Christ told his disciples to go into all parts and heal the sick.

The priests of the Christian Church preach the removal of sin, but leave untouched the healing of the sick.

So far as what we term preventable disease is concerned I would urge that Sanitation should be made a branch of our elementary education: but meanwhile with us the Sanitary Inspector is the missionary upon whom devolves the duty of explaining to the people the importance of paying a close attention to sanitary details.

I look upon this duty, which lies upon the Sanitary Inspector, of educating the people in sanitation as a great and important mission, and I should like to impress upon all Sanitary Inspectors the importance of the educational position which they hold. They are continually in direct touch with the people, and they possess admirable opportunities ready to their hands for explaining to the people the importance of paying close attention to sanitary details. Until the people themselves feel the importance of sanitation, very little real and substantial advance can be made by the nation.

Acts of Parliament may be necessary to assist sanitary progress and to enforce sanitary discipline, but laws can do little unless aided by the earnest, the strenuous co-operation of every individual member of the community.

The Sanitary Inspector has it in his power in the daily exercise of his duty, to explain, to teach, and to show practically to the artizan and to the labourer how by care and attention to cleanliness in their persons, their food, their homes, and their surroundings, they can preserve their own health, and save their children and families from preventable sickness and death.

Therefore I would urge upon you that your motto is contained in the proverb—"Prevention is better than cure." And I cannot, perhaps, more appropriately conclude my remarks than by quoting four lines from Oliver Wendell Holmes' poem, entitled "The Two Armies," which sum up in a few words the duty, which it should be the aim of the Sanitary Inspector to fulfil:—

"Along its front no sabres shine,
No blood-red pennons wave;
Its banner bears the single line
'Our duty is to save.'"

REVIEWS OF BOOKS.

THE PURIFICATION OF SEWAGE AND WATER.*

Chemists and Engineers will find little in this work which th have not already had an opportunity of reading, in either cont butions to societies or in official reports. Nevertheless they w welcome the compilation and combination of the scattered leaves in one volume. Here is to be found a clear, concise, almost popular d scription of the methods in use for filtering sewage in such a way to take the fullest advantage of the minute forms of life which appe to be the active agencies of fermentation and putrefaction. Th experiments carried on with respect to the purification of sewage i Massachusetts, London, Sutton, and Exeter are detailed; the purifi cation of water; the past and present condition of the Thames; th action of water on lead; the ventilation of sewers, and some purel analytical details are all included. It is obvious that all these sub jects could not be treated exhaustively in a volume of such moderat size. The main and most interesting part of the work relates t sewage, the more especially to Mr. Dibdin's own experiments on th sewage of London and the sewage of Sutton. The various tabl showing the composition of the sewage and the effluents of vario towns are particularly useful; and Mr. Dibdin's observations on importance of analysing suspended matter, as well as his metho collecting and measuring it, are at once novel and of the hig practical value.

The work, taken as a whole, records an era in the treatme sewage. Chemists and Engineers are no longer groping in the but are endeavouring to apply natural agencies in the most eff manner. Mr. Dibdin conclusively proves that the old meth broad and intermittent irrigation are not necessary, and that situated on soil most unsuitable for such methods may, by a method of filtration—the filters themselves being of moderate attain excellent practical results.

Mr. Dibdin makes some excellent remarks as to the folly authorities trusting complicated schemes of sewage disposa supervision of officers not specially skilled; he very rightl that the results of all schemes should be regularly ascert chemical investigation.

The book is well printed, it is illustrated by charts, woo maps, and may be confidently recommended as indispensab tarians generally as a handbook of the particular subject de

A.

* By W. J. Dibdin, F.C.S., F.I.C. 2nd Edition. London S lishing Co. 276 pp., 8vo. Price £1 1s.

THE REMOVAL AND DISPOSAL OF TOWN REFUSE.*

This book is chiefly a collection of statistics and reports (reference to which is given by the author) upon this difficult and somewhat complicated subject, and the author has been at considerable trouble in placing before his readers the latest and most complete information thereon.

The chapters on Refuse Destruction are very complete and include reliable statistics from upwards of 100 towns where destruction by fire has been adopted. The concluding chapter on thermal storage will be read with interest by those engaged in solving the problem of the utilisation of waste heat for producing power.

We commend the work to those who wish to advance new theories as well as to those who have the difficult and somewhat unappreciated task of supervising the collection and disposal of town's refuse.
C. M.

SANATORIA FOR CONSUMPTIVES IN VARIOUS PARTS OF THE WORLD.†

A prolonged study of the subject, dating back to a time long anterior to the recent popular movement, has given Dr. Rufenacht Walters the right to speak with some authority on the principles which should govern the establishment and the conduct of sanatoria for consumptives. It was expected that his book would be comprehensive and practical, and expectation has not been disappointed. In the first sixteen chapters, occupying eighty-two pages, the author discusses the general principles which should be kept in view, and this summary will be found exceedingly informing by architects and physicians who may be considering the erection of sanatoria in this country at the present time. The second part of the book which consists of descriptions of sanatoria already in use in various parts of the world, contains a number of block plans which will be useful for the same purpose.

These principles are indeed simple, so simple that they are apt to be overlooked or forgotten in the search for novelty. There is plenty of room for the exercise by the architect of his taste, and of his powers of designing, but he must grasp the objects in view, otherwise we shall have costly failures. He must subordinate every other consideration to the great principle of providing the inmates with fresh air indoors, and every facility for spending as many hours a day out of doors as ingenuity can compel the climate to afford. The least satisfactory part of the book is that which deals with the disposal of excreta. This is not exactly the fault of Dr. Walters

* By W. H. Maxwell. London Sanitary Publishing Co. 372 pp. Price 15s.

† By F. Rufenacht Walters, M.D., M.R.C.P., with an introduction by Sir Richard Douglas Powell, Bart., M.D., F.R.C.P. London. Swan Sonnenschein and Co., 1899.

who describes divers systems followed in various sanatoria, but the subject has not yet received all the attention which it deserves. With regard to site, there is room for great variety, and it is probable that we shall eventually find that different types of site are best adapted to different types and stages of consumption. It may be useful to transcribe the features which Dr. Walters finds to be common to the localities which benefit the more curable cases, and which he therefore looks upon as essential:—"(1) They have a pure air, free from dust and smoke, and the impurities which are inseparable from a dense population. (2) They are fresh and bracing, but well protected against cold or stormy winds. (3) They have sufficient fine weather or sufficient artificial shelter, to render an out of door life possible, and (4) They have a dry, warm, well-drained soil."

The greater part of the space [illegible] the book is taken up by a description of sanatoria, already in [illegible]istence in America, German[illegible], France, Switzerland, and other coun[illegible]es. These descriptions are [illegible] many instances illustrated by ph[illegible]graphs, and by block plan[illegible]. Special interest attaches to the p[illegible] devoted to the sanatoria f[illegible]r tuberculous children in Fran[illegible]rk in which that country ha[illegible]s taken the lead of all others. [illegible]k concludes with a chapter o[illegible] British needs and resources, a[illegible]aphy, and an excellent inde[illegible]. Taken altogether it is to be in every respect heartily commended.

D. W.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions.
Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

Science in relation to Hygiene and Preventive Medicine.

BEHLA, ROBERT. Ueber vermehrtes und endemisches Vorkommen des Krebses. *Cent. f. Bakt., Parasit. u. Infekts.-krank*, Bd. XXIV., pp. 780, 829. 875, and 919.

Distribution of carcinoma in a small town (Luckau, 5,000 inhabitants). Possible connection with consumption of uncooked vegetables.

The parasitic theory with special reference to *Plasmodiophora brassicæ*. Statistics of increase of cancer in Prussia, and of its prevalence in other countries.

CAPPELLETTI, Dr. E., und VIVALDI, Dr. M. Ueber den Streptococcus Equi. *Archiv f. Hygiene*, Bd. XXXIV., Heft 1, 1898. p. 1.

On the *Streptococcus Equi*. Experimental investigations.

CZAPLEWSKI, —. Zur Frage der bei Keuchhusten beschriebenen Polbakterien. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., p. 865.

Description of the bacterium and its cultivations (photographs), and of staining reactions.

DENYS, J. Compte-rendu des travaux exécutés sur le streptocoque pygène (Institut de Bactériologie de l'Université de Louvain). *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV. p. 685.

Summary of a series of researches made in the Institute (by Marbaix, J. and W. Leclef, Marchand, Van de Velde, Meunes, Hubert and the author) on the coccus mentioned. The most important conclusion seems to be that a virulent streptococcus is one which is not attacked by the phagocytes; that the effect of vaccination against the streptococcus is to produce a modification in the serum which checks the growth of the microbe, and also renders it more liable to the attacks of phagocytes, the latter being the more important.

FAJARDO, F. (Rio Janeiro). Von der Hämatozoarie des Beriberi und deren Pigment. *Cent. f. Bakt., Parasit. u. Infekts.-krank*, Bd. XXIV., p. 558.

Description of a hæmatozoon found in the blood (visceral and peripheral) in beri-beri. The organism produces pigment, can form spores, and in the stages of its development resembles the parasite of malaria.

GRENDIROPOULOS, Dr. MILTON. Influence des Agents Atmosphériques sur les Microbes du Sol. *Revue d'Hygiène*, August, 1898, p. 697.

Study of microbes on the surface of the soil. Analysis of earth. Effect of temperature and light on microbes of the soil. Influence of moist heat greater than that of dry heat.

HOUSTON, A. C. Note on four micro-organisms isolated from the mud of the River Thames, which resemble *Bacillus typhosus*. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., p. 518.

Description of the chief morphological and biological characters, and a comparison with those of *B. typhosus*.

JSUJITANI, J. (Tokyo). Ueber die Reincultur der Amöben. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., p. 666.

A method of obtaining pure cultivations of amœbæ from fluids containing various bacilli, etc. The method depends on the power of the cystic stage of amœbæ to resist drying.

KAMEN, LUDWIG. Zur Aetiologie der Cerebrospinalmeningitis. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., 545.

The relative frequency with which various micro-organisms are found in cerebro-spinal meningitis, with an account of a case (adult) from which the meningococcus intracellularis was obtained.

LEHMANN, Dr. K. B. Einige Bemerkungen zur Geisselfrage. *Archiv f. Hygiene*, Bd. XXXIV., Heft 3, 1899, p. 198.

Some observations on the flagella question. A postscript to H. Zerler's work on p. 192.

LOEFFLER, Prof. Dr. Bericht der Kommission zur Erforschung der Maul- und Klauenseuche bei dem Institut für Infektionskrankheiten in Berlin. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., p. 569.

Evidence that the infection is due to a living particulate body capable of multiplying in the body of susceptible animals. Infection through the alimentary canal. Production of immunity by injection of a mixture of virulent lymph with the serum of an animal which had acquired immunity.

MCFARLAND, JOSEPH. Bacillus anthracis similis. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., p. 556.

Description of a bacillus, obtained from an unusual form of absce closely resembling the *Bacillus anthracis*, but possessing no path genic properties.

MANN, Dr. CONRAD. Beiträge zur Frage der specifisc Wirkung der Immunsera. *Archiv f. Hygiene*, Bd. XXXI Heft 3, 1899, p. 179.

Contributions to the question of the specific action of the Imm Sera.

RÜZICKA, Dr. S. Vergleichende Studien über den Ba pyocyaneus und den Bacillus fluorescens liquefa *Archiv f. Hygiene*, Bd. XXXIV., Heft 2, 1898, p. 14

Comparative studies of the *Bacillus pyocyaneus* and the *B fluorescens liquefaciens.*

SCHOTTELIUS, Dr. MAX. Die Bedeutung der Darmba für die Ernährung. *Archiv f. Hygiene*, Bd. XXXIV 3, 1899, p. 210.

On the importance of intestinal bacteria for nutrition.

SHIGA, K. (Tokyo). Ueber den Dysenteriebacillus (*Bacillus dysenteriæ*). *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., pp. 817, 870, and 913.

Full description of bacillus found by the author in the dejections of thirty-four cases of dysentery, and in two fatal cases in the intestinal and mesenteric glands. This bacillus found in all cases of dysentery, but not in other patients. Gave with the blood serum of patients suffering from dysentery an agglutinative reaction. Injection of its cultivations into the peritoneal cavity produced in guinea-pigs hæmorrhages into the intestinal wall, and blood in the intestines; in puppies and a cat thin mucous diarrhœa. Investigation commenced as to immunisation.

SPIEGELBERG, H. Ein weiterer Beitrag zur Streptokken-Enteritis in Säuglingsalten. *Cent. f. Bakt., Parasit. u. Infektskrank.* Bd. XXIV., p. 49.

A fatal case of diarrhœa in an infant, in which the enteritis was associated with a streptococcus.

THIELE, Dr. H., und WOLF, Dr. K. Ueber die bacterienschädigenden Einwirkungen der Metalle. *Archiv f. Hygiene*, Bd. XXXIV., Heft 1, 1898, p. 43.

On the destructive action of various metals on bacteria.

WOLF, LEO. Ueber den Einfluss des Wassergehaltes der Nährböden auf das Wachsthum der Bacterien. *Archiv f. Hygiene*, Bd. XXXIV., Heft 3, 1899, p. 200.

On the influence of the amount of moisture in culture media on the growth of bacteria.

ZIERLER, FRANZ. Ueber die Beziehung des Bacillus implexus Zimmermann zum Bacillus subtilis Cohn: Ein Betrag zur Lehre von der Variabilität der Spaltpilze. *Archiv f. Hygiene*, Bd. XXXIV,, Heft 3, 1899, p. 192.

On the relation of the *Bacillus implexus* of Zimmermann to the *Bacillus subtilis* of Cohn: a contribution to the doctrine of the variability of *Schizomycetæ*.

ZUSCH, OTTO. Bakteriologische Untersuchungen bei Keuchhusten. *Cent. f. Bakt., Parasit. u. Infektskrank.*, Bd. XXIV., pp. 722 and 769.

Identification of the same bacillus as found by Czaplewski and Hensel and by Koplik. Mode of obtaining. Arguments for its specificity: (1) habitual presence in whooping-cough and absence from the sputum in other conditions; (2) the agreement between the bacteriological observations and the clinical course; (3) the greater abundance of the bacillus during the catarrhal stage, when the disease is most infectious.

ANTONY, Dr. UBALDO. Expériences relatives aux eaux potables qui ont parcouru des tuyaux en plomb. *La Technologie Sanitaire*, January 15th, 1899, p. 286.

Results of experiments on the lead-dissolving properties of water when charged with various salts. Influence of aëration.

CHLOPIN, Dr. G. W. Ein neues Verfahren zur Bestimmung des Sauerstoffs in Gasgemengen. *Archiv f. Hygiene*, Bd. XXXIV., Heft 1, 1898, p. 71.

A new method for the estimation of oxygen in mixtures of gases.

JOLLES, Dr. ADOLF. Eine colorimetrische Methode zur Bestimmung der Phosphorsaüre im Wasser. *Archiv f. Hygiene*, Bd. XXXIV., Heft 1, 1898, p. [illegible]2.

A colorimetric method for the estimation of phosphoric acid in water.

MARKL, Dr. G. Ueber eine neue Methode zur Bestimmung der Mauerfeuchtigkeit. *Archiv f. Hygiene*, Bd. XXXIV., Heft 2, 1898, p. 87.

A new method for the estimation of dampness in walls.

RICHMOND, H. DROOP, and STOKES, A. W. Two papers upon automatic burettes. *The Analyst*, January, 1899, pp. 2 and 4.

Deals with useful suggestions in constructing automatic apparatus for the purpose of rapidly, accurately, and safely measuring liquids, especially such liquids as strong ammonia and sulphuric acid.

BARTHÈS, Dr. E. Des Causes de la Mortalité des Enfants dans leur première année d'existence et les moyens d'y remédier. *Revue d'Hygiène*, July, 1898, p. 641.

Statistics of mortality of infants at different periods under one year of age, and the principal diseases causing death. Intestinal diseases—their causes and preventives: isolation, sterilisation of milk and vessels, etc. Bottle feeding. Diet. Selection of nurses.

LEPAGE, Dr. G. De la Statisque dans les Services d'Accouchements. *Revue d'Hygiène*, April, 1898, p. 338.

Clinical statistics of maternity.

DORAUGE, M. le Dr. Epidémie de Fièvre Typhoide due á l'ingestion de glace impure. *Revue d'Hygiène*, April, 1898, p. 295.

Outbreak of enteric fever due to consumption of contaminated ice-water from a river.

DROUINEAU, Dr. G. La réglementation de la Prostitution. *Revue d'Hygiène*, June, 1898, p. 508.

Public indifference to State regulation of prostitution in France. Increase of clandestine, and decline of regulated, prostitution in large French towns. Syphilis among British troops in India. Hospital treatment. Debate in the Academy of Medicine in 1888.

GAUTIER, Dr. G. Recherches Bactériologiques sur un cas de Fièvre Jaune, exécutées au lazaret du Frioul. *Revue d'Hygiène*, October, 1898, p. 884.

Bacteriological investigation of a case of yellow fever in hospital at Marseilles.

GRANCHER, Prof. La prophylaxie de la Tuberculose. *Revue d'Hygiène*, June and July, 1898, pp. 481 and 605.

General prophylactic measures. Tuberculosis in the family. Questions of heredity, curability, communicability. Diagnosis. Tuberculin. Röntgen rays. Notification. Tuberculosis in the Army. Selection of the soldier. Sanitation of barracks. Tuberculosis in schools, hospitals, etc. General conclusions. Bovine tuberculosis. Proof of identity with human tuberculosis. Experimental inoculation and ingestion of tubercle by Villemin, Chauveau, and others. Susceptibility of young animals, and especially calves, to infection. Tuberculous meat as food in relation to economics. Changes of opinion. Nocard's experiments on animals with muscle juice from tuberculous cows. Ingestion of tuberculous meat with negative results. Tuberculous milk dangerous even without disease of the udder. Butter and cheese from tuberculous cows. Recent French legislation respecting tuberculosis in cattle, meat, and milk.

LARDIER, Dr. Une Epidémic de Charbon. *Revue d'Hygiène*, May, 1898, p. 431.

Account of a recent outbreak of Anthrax affecting five human beings and several cats, and traced to a diseased cow. Infection believed to have been originally water-borne.

LEGRAIN, Dr. E. L'Ergistome en Kabylie. *Revue d'Hygiène*, April, 1898, p. 300.

Description and etiology of the disease among natives of Bougie (Algeria), with illustrations.

MARTIN, SIDNEY, M.D., F.R.S. Tuberculosis. *The Journal of State Medicine*, March, 1899, p. 125.

The nature of the infection, the opportunities of infection, the modes of infection, prevention and treatment, are all dealt with.

VALLIN, Dr. E. La prophylaxie de la Tuberculose. *Revue d'Hygiène*, July, 1898, p. 577.

Summary of discussion of the report of Dr. Graucher to the Academy of Medicine on Tuberculosis (*Revue d'Hygiène*, June, 1898, p. 481.

VALLIN, Dr. E. La nouvelle loi sur la Vaccination en Angleterre. *Revue d'Hygiène*, September, 1898, p. 769.

Observations on the English Vaccination Act of 1898, and the "causes which have produced such a recoil."

VIVANT, Dr. J. E. Progrès sanitaires réalisés depuis dix aus dans la principauté de Monaco. *Revue d'Hygiène*, November, 1898, p. 983.

Ten years of sanitary progress in the Principality of Monaco. Sanitary legislation, sewers, roads, water supply, abattoirs, etc.

Hygiene of Special Classes, Trades and Professions, and Municipal Administration.

BOUBNOFF, Prof. S. L'Institut d'Hygiène de l'Université Impériale de Moscou. *Revue d'Hygiène*, November, 1898, p. 970.

Description of the Institute of Hygiene and Sanitary Station of the Imperial University of Moscow.

COLLINS, ARTHUR E., A.M.I.C.E., and WILES, W. DOUGLAS. Description, with plans, elevations, sections and perspective view, of Norwich Technical School, now in course of erection by the Corporation. *The Builder*, 21st January, 1899, p. 67.

MANGENOT, Dr. La Visite médicale quotidienne des Ecoles primaires. *Revue d' Hygiène*, October, 1898, p. 886.

Daily medical inspection of elementary schools. Descriptive account of the organisation, working, and cost of the system in Boston, New York, Chicago. In preference the author recommends isolation, disinfection and notification.

TAVEL, —. Das bakteriologische Institut der Universität Bern. *Cènt. f. Bakt., Parasit., u. Infektskrank.*, Bd. XXIV., 1898, pp. 670 and 742.

Description, with plans and photographs, of the new Bacteriological Institute at Berne.

WATSON, WILLIAM. New Infirmary and Steam Laundry, Wakefield Union. *The Builder*, December 31st, 1898, p. 608.

Description of the building.

ARNOULD, Dr. E. Les Nouveaux Hôpitaux de Belfort et de Montbéliard. *Revue d'Hygiène*, September, 1898, p. 788.

Description and plans of the new General Hospitals at Belfort.

AZIÈRES, M. Sur la création de Sanatoria pour phthisiques indigents. *Revue d'Hygiène*, April, 1898, p. 344.

Plan and description of a proposed Sanatorium for indigent consumptives.

LOOMIS, Dr. ALFRED L. The Loomis Sanitarium. *Engineering Record*, 14th January, 1899, p. 146.

Description of the Loomis Sanitorium for consumptives at Liberty, N.Y. (Illustrated).

MIDDLETON, G. A. T. Sanitary Principles in the Construction of Isolation Hospitals. *The Engineering Magazine*, November, 1898, p. 269.

Sets forth the general principles, illustrated by plans, of the Park Hospital and the Linslade Hospital.

RAYNAUD, Dr. L. Étude sur le service sanitaire maritime au Port de Hamburg et sur le Station de désinfection. *Revue d'Hygiène*, May, 1898, p. 427.

Mode of supervision of vessels at Cuxhaven. Sanitary service at Hamburg. Seaman's Hospital. Disinfecting Station. Compulsory disinfection of midwives.

VALLIN, Dr. E. Les doléances des Médecins sanitaires maritimes. *Revue d'Hygiène*, December, 1898, p. 1057.

Grievances of ships' surgeons. Service with different French shipping companies compared. Port sanitary inspection. How to improve the condition of the ship's surgeon. Future of the ship's surgeon.

BUNEL, M. Les travaux de démolition et de terrassement au point de vue de l'hygiène. *Revue d'Hygiène*, November, 1898, p. 962.

Recent demolition of buildings in Paris and the resulting "made-ground," from a hygienic point of view.

CHEYSSON, M. E. Les Bains-douches populaires. *Revue d'Hygiène*, December, 1898, p. 1089.

Public shower-baths of Paris. Announcement that this project, lue to private enterprise, is about to be realised.

LIVINGSTONE, GEORGE, A.M.I.C.E. An English Municipal Engineer's Visit to America. *The Surveyor*, January 27th, 1899, p. 137.

Traffic in streets. Paving. Street cleansing. Dust removal. Water supply. Baths and Wash-houses. General Sanitation, etc.

MASSON, LOUIS. L'assainissement de la ville de Fribourg-en-Brisgau. *Revue d'Hygiène*, October, 1898, p. 865.

Municipal sanitation in the town of Fribourg-in-Brisgau (Grand Duchy of Baden). Water supply. Sewerage. Drainage. Sewage purification.

RICHARD, Dr. E. L'assainiss[illegible]t général de la ville de Lyon. *Revue d'Hygiène*, December, [illegible]8, p. 1079.

Observations on the general sa[illegible]on of the city of Lyons.

SNELL, A. SAXON, F[illegible] Public Baths. *The Builder*, 11th March, 1899, p[illegible]

A description of the planning a[illegible] constructive details of recent Public Baths.

TILTMAN, A. HESSELL, F.R.[illegible]. Public Baths and Wash-houses. *Journal of the Roy[illegible] Institute of British Architects*, 11th February, 1899, p. 169.

A description of Public Baths and Washhouses in Germany, Austria, and Great Britain, and a suggestion for a system of central and branch establishments, classified and distributed to suit the special needs of each district. The "Rain-Douche Bath" is recommended as being cleaner and quicker, economical as regards consumption of water and attendance, and less liable to spread disease by infection than the ordinary "slipper" bath.

COLES, SHERARD COWPER. Notes on the preserving and fire-proofing of timber and timber substitutes. *Engineering*, Feb. 24th, 1899, p. 258.

Present known methods limit fireproofed wood to internal work. Tendency to corrode metals. Various processes for rendering wood fireproof. Drying of wood. Composition of wood.

GIBSON, R. W. Fireproof Buildings. *The Building News*, March 3rd, 1899, p. 294.

Special features of fire risks of high buildings. Abstracts of a paper ordered to be printed by the Chamber of Commerce, New York.

Building Materials, Construction, and Machinery.

ANNEQUIN, Dr. Le Paraffinage des Planchers. *Revue d'Hygiène*, November, 1898, p. 979.

The use of paraffin for rendering wood flooring impermeable. Its preparation and mode of application.

CAWS, FRANK, F.R.I.B.A. Haskinised Wood. *Journal of the Royal Institute of British Architects*, 11th March, 1899, p. 270.

Description of method of seasoning and solidifying wood by heated air under great pressure.

SABIN, Prof. A. H. The Protection of Metal Work. *Engineering Record*, 7th January, 1899, p. 120.

Importance of protecting iron and steel structures. Methods of painting.

TILLSON, G. W., M.Am.Soc.C.E. Paving Materials. *Engineering Record*, November 26th, 1898, p. 562.

Essentials. Cost. Durability. Resistance to traffic. Maintenance. Effects on public health. Comparison of different systems.

Water Supply, Sewerage, and Refuse Disposal.

BERRINGTON, R. E. W., A.M.I.C.E. The source of town water supplies and their bearing upon public health. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 109.

BUILDER, THE. Water supply from the chalk. December 17th, 1898, p. 545; January 14th, 1899, p. 29.

To discuss and study in detail the evidence for and against water supply for London from the chalk instead of from Wales. For purposes of study the chalk areas are divided into eleven districts. Two key sketch maps, shewing districts, given. Yield of wells at Barnet, Bushey, Watford, etc. Influence of porous and impervious soils above and below the chalk, and wells upon rivers.

CHAMIER, GEORGE, M.Inst.C.E. Flood Discharges. *Engineering Record*, 21st January, 1899, p. 163.

Catchment area. Rainfall. Surface discharge. Diminution inproportionate. Flood discharge due to area. Method of calculation. Practical application.

FRANKLAND, Prof. PERCY F., Ph.D., F.R.S. The chemical and bacterial Examination of Water. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 54.

FUERTES, J. H., M.Am.Soc.C.E. The yield of Wells and collecting Galleries in permeable soils. *The Engineering Record*, December 10th, 1898, p. 28.

Methods of testing yield. Formulæ. Diagrams shewing results in various cases.

GÜNTHER, Prof. Dr. C. and SPITTA, Dr. O. Bericht über die Untersuchung des Berliner Leitungswassers in der Zeit vom April, 1894, bis December, 1897. *Archiv f. Hygiene*, Bd. XXXIV., Heft 2, 1898, p. 101.

Report on the investigation (bacteriological and chemical) of the Berlin water supply from April, 1894, to December, 1897.

HILDRED, E. T., A.M.I.C.E. The Water Supply of Gosport. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 127.

INGHAM, W., A.M.I.C.E. Municipalization of Watersheds. *The Surveyor*, February 24th, 1899, p. 262.

Report to Torquay Town Council. A summary of answers to queries addressed to the most important Boroughs of the United Kingdom.

NICHOLS, H. BERTRAM, A.M.I.C.E. Water Supply from the Lower Greensand, and Constructional Works connected therewith, at Leighton Buzzard. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 194.

Position and constituents of Lower Greensand formation. Waters from Lower Greensand. Section of well at Leighton Buzzard. Analytical data of water. Water tower. Filtration, etc.

MATTHEWS, W., M.Inst.C.E. The position, responsibilities, and duties of the Waterworks Engineer and Manager. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 7.

PEARSON, H. W., M.Inst.C.E. Springs and Wells for Town Supplies, and works in connection with same. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III., 1898, p. 22.

COTTRELL, H. E. P., A.M.I.C.E. The Purification of Drinking Water (continued). *Engineering*, November 25th, 1898, p. 671; December 16th, 1898, p. 767.

Results obtained by Dr. Van Ermengen (Ghent) of works of investigation at Oudshoorn, for Ministry of Agriculture of Belgium, on the sterilization action of process there employed, and effect on chemical composition. Cost of sterilizing water. Water treated by polozone. Prof. Van Ermengen's analyses.

PRIESTLEY, C. H., A.M.I.C.E. Extension of Filter-Beds, etc., Service Reservoir, and Water Tower, Cardiff. *Transactions of British Assoc. of Waterworks Engineers*, Vol. III,, 1898, p. 80.

COLEMAN, T. E., F.S.I. Iron Construction in Drainage Work. *Building News*, January 27th, 1899, p. 120 (and subsequent numbers).

Soil, waste, and ventilation pipes. Methods of jointing, etc.

CORBETT, J. (Borough Engineer, Salford). Precautions in Foul Sewers. *The Builder*, 11th March, 1899, p. 256.

Regulations drawn up by Mr. Corbett for providing for the safety of men employed in sewers in which foul gases may have collected.

BECHMANN, M. Nouveaux aperçus sur l'épuration des eaux d'égout. *Revue d'Hygiène*, April, 1898, p. 332.

Bacterial treatment of sewage in England.

BUILDER, THE. Bacterial Filter Bed, Tonbridge. 11th Mar., 1899, p. 260.

Description of construction of bed.

RIDEAL, S., D.Sc. The Bacterial Treatment of Sewage. *The Surveyor*, February 3rd, 1899, p. 172.

Early methods and results. Bacterial researches and experiments. Anaërobic preparation.

THUDICHUM, GEORGE, F.C.S. The Bacterial Treatment of Sewage. *The Surveyor*, December 9th, 1898, p. 735.

Considerations to be entertained in applying the biological method. Advantages of bacterial process as compared with chemical precipitation and land treatment. Sewage from public institutions and small communities.

VIGERS, ROBERT. Presidential Address to the Surveyors' Institutions. Transactions Surveyors' Institutions, Session 1898-99. Vol. XXI., Part I., November 18th, 1898, p. 643.

The growth of London. Housing problem in London. Sewage disposal. The septic system.

GARRETT, HENRY E. Dust Destructor Tests at Torquay. *The Surveyor*, February 17th, 1899, p. 237.

Report to Town Council: Results of three tests as to nature of refuse burned, men employed, cost per ton, steam pressure, residuals, etc.

KELVIN, LORD, and BARR, Prof. Refuse Destruction and Utilization. *The Surveyor*, March 17th, 1899, p. 354.

Full report on the Horsfall system of refuse destruction.

Heating, Lighting, and Ventilating.

MARTIN, Dr. A. J., and WALCKENAER, C. Note sur le controle de la désinfection dans les étuves à vapeur. *Revue d'Hygiène*, August, 1898, p. 680.

Proofs of efficiency of a disinfecting stove. Registering thermometers. A new special form. Diagrams of results of experiments. Essential factors of success in stoving. Charging and length of exposure. Methods of comparing efficiency of different kinds of stove.

WOODBRIDGE, Prof. S. H. School-house Warming and Ventilation. *Engineering Record*, continued from p. 476, October 29th; November 12th and 19th, 1898, pp. 523 and 544.

Preparatory warming. Warming by rotation. Heat commonly wasted. Solar heat. Automatic control of temperature. Double glazing and sashing. Plenum and vacuum methods. Location of inlets. Location of outlets. Special local ventilation. Air filtration. Air humidity. Method of warming.

ENGINEERING. The Smoke Nuisance in its legal aspect. Mar. 10th, 1899, p. 302.

Existing legislation. Summaries of cases. The present condition of things does not admit of much improvement. The formation of a society for encouraging invention desirable.

Personal and Domestic Hygiene.

BERTHIER, Dr. A. Utilisation du Suint en hygiène. *Revue d'Hygiène*, May, 1898, p. 409.

Lanoline Waterproofing of soldiers' garments. Hygiene of the foot and boot.

ALBERTONI, Prof. PIETRO. Kostordnung in den italienischen Krankenhäusern. *Archiv f. Hygiene*, Bd. XXXIV., Heft 3, 1899, p. 244.

Dietaries in the Italian hospitals.

PAGLIANI, Dr. L. La panification intégrale du froment. *Revue d'Hygiène*, May, 1898, p. 392.

The more complete utilization of the grains of wheat in the making of bread. Waste under existing methods. Loss of bran. Its increased digestibility when finely ground. New method of immediate reduction of wheat into dough for bread-making (Desgoffe's patent). Mechanical separation of the woody corticle (only) of the grain. Description of apparatus. Experiments proving increased amount of assimilable nitrogen (albuminoid and nutritive matter) in "integral bread" as compared with other kinds.

RICHARD, Dr. E. Les Viandes ladres. *Revue d'Hygiène*, April, 1898, p. 350.

Measly meat (pork and beef). Its relative prevalence in different countries, etc. Localization of disease in the quadruped. Necessity for careful inspection, Effect of cooking, salting, refrigeration, and freezing on the *Cysticercus*. Results of recent experiments. Consumption of meat slightly measled in Germany after cooking, salting, or refrigeration, officially sanctioned in 1897. How dealt with in different towns in France.

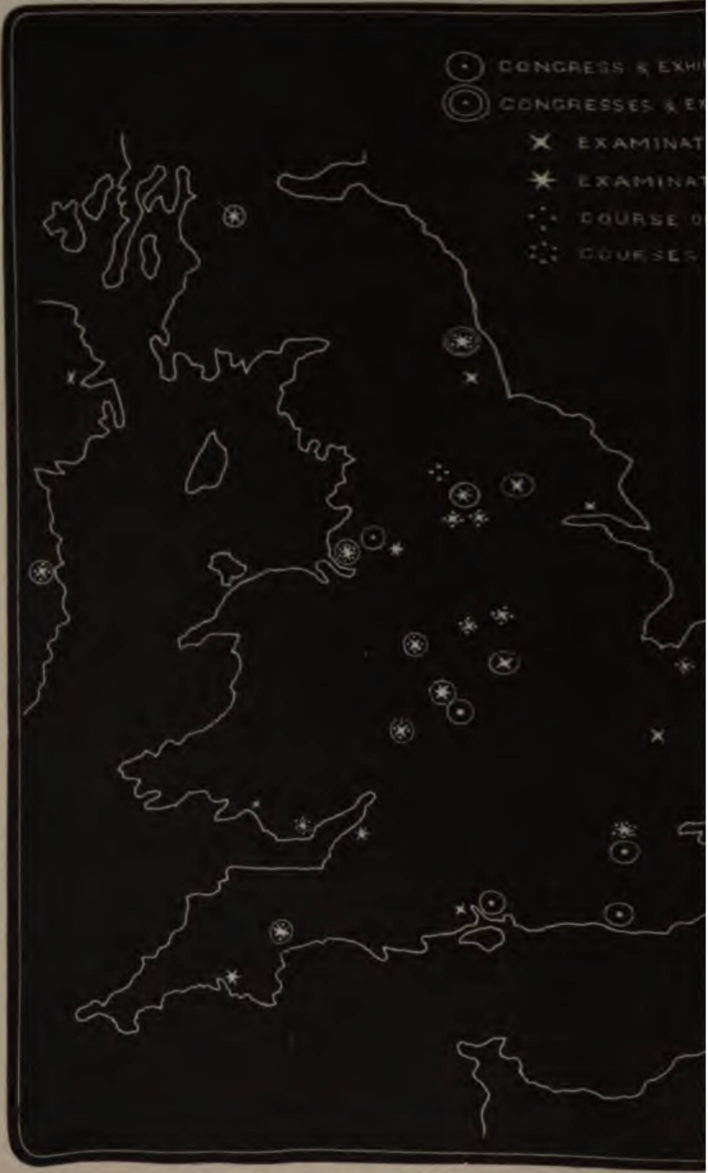
SMOLENSKY, Dr. P. O. Les Poissons au point de vue hygiénique (translated from the Russian). *Revue d'Hygiène*, April and May, 1898, pp. 314 and 438.

Classification, composition, and nutritive values of different kinds of edible fish. Venomous and poisonous fish, their distinction and classification. Bacteriology and toxic effects of decomposed fish. Dangerous parasites of fish. Prophylactic measures. Inspection of fish.

SCHÜRMAYER, Dr. C. B. Zur Kennitnis der Wirkung von Kresolen bei deren Verwendung zur Desinfection. *Archiv f. Hygiene*, Bd. XXXIV., Heft 1, 1898, p. 31.

The action of Cresol as indicated by its application to disinfection.

Map showing the various centres to which the work of The S Institute has been extended.



Congresses, 17. Examinations, 166. Courses of Lectures

ANNUAL REPORT OF THE COUNCIL

FOR THE YEAR 1898.

Read at the Ordinary General Meeting, March 22nd, 1899.

INTRODUCTION.

During the year 1898 several very important questions affecting public health have attracted a large amount of attention and activity, and the Institute at its Congress and other meetings has brought these subjects forward for discussion, and aided as far as possible to advance and disseminate knowledge relating to them.

Among them may be mentioned:—

The measures for investigating and preventing the spread of Tuberculosis.

The question of Rivers Pollution Prevention and Purification of Water Supplies.

Smoke Abatement.

Bacteriology especially as affecting Sewage Purification.

The question of River Pollution being of so much importance in connection with water supply, the Council have appointed a standing Committee to deal with the subject, and are arranging Conferences for the purposes of awakening public interest and formulating public opinion, so that some definite and more effective methods may be adopted for preventing the pollution of our rivers and water supplies.

ASSOCIATED WORK.

The Ninth International Congress of Hygiene and Demography was held at Madrid in April, to which a representative was appointed by the Institute, and an account of the meeting appeared in Part II., Vol. XIX., of the Journal.

The Institute also appointed a delegate to the Fifth International Congress of Hydrology and Climatology and Medical Geology, held at Liége in September; a note of the meeting appeared in Part III., Vol. XIX. of the Journal.

A Conference was called together in December, under the auspices

of The National Association for the Promotion of Technical and Secondary Education, to consider the subject of the education and registration of plumbers, with special reference to the differences which arose in connection with the Plumbers Registration Bill, introduced into the House of Commons last session.

A number of Societies interested in technical education, examinations, and the plumbing trade were represented, and the Institute appointed several delegates. Resolutions were passed to the effect:

> "That if a Plumbers' Registration Bill were promoted, the Registration Council should include directly appointed representatives of bodies dealing with technical education.
>
> "That the examination of other approved bodies should be accepted as qualifying for registration.
>
> "That the examinations should test candidates' knowledge of other branches of the building trade.
>
> "That in any Bill, the Council created by the Bill should be the actual managing body, and have direct charge of the registration, and further that the conduct of the Bill should not be left in the hands of any one body."

SANITARY LEGISLATION.

The Institute had under consideration the following Bills introduced into Parliament during the year. The action taken by the Council and the fate of the Bill is noted in each case:—

Local Government (Ireland) Bill. Brought in by Mr. Gerald Balfour, Mr. Balfour, Mr. Chancellor of the Exchequer, and Mr. Attorney-General for Ireland.

The Council urged upon the backers of the Bill that provision should be introduced for the appointment of County Medical Officers of Health, and an amendment to this effect was put down by Mr. Horace Plunkett, but not inserted.

The Bill was passed and received the Royal assent.

Plumbers' Registration Bill. Brought in by Mr. Knowles, Mr. Michael Austin, Dr. Farquharson, Mr. Fenwick, Mr. Kimber, Sir Francis Powell, and Mr. Richardson.

This Bill, which was first introduced in 1892, was again brought forward. The Council petitioned against the Bill, and suggested amendments in Committee for the second reading; but the debate was not concluded, and before the close of the session the Bill was dropped.

Public Health Acts Amendment Bill, but the Bill was withdrawn before any action was taken.

Rivers Pollution Prevention Bill. Brought in by Sir Francis Powell, Mr. Wyvill, Mr. Henry Hobhouse, Sir John Dorington, Sir Henry Howarth, Dr. Farquharson, Sir John Brunner, Mr. Kenrick, Sir Walter Foster, and Mr. Brigg.

A Bill to make more effectual Provision for prevention of the Pollution of Rivers and Streams. The Council petitioned in favour of this Bill, but suggested that the clause relating to solid matter in suspension should be so amended as to include this as a pollution. The second reading was not reached before the close of the session.

Vaccination Bill. Brought in by Mr. Chaplin, Mr. Balfour, Secretary Sir Matthew White Ridley, and Mr. Attorney-General.

The Sanitary Institute joined the Society of Medical Officers of Health and other bodies in a memorial to the Local Government Board, urging that the Bill should contain provisions dealing with the following matters:—

1. That the age limit within which a child should be vaccinated after birth should be six months.

2. That evidence of efficient vaccination should be afforded on the admission of a child to a public elementary school.

3. That it is essential that the Vaccination Act should contain a definition of efficient vaccination.

4. That it is essential that the State should take steps to require the revaccination of all persons on their attaining the age of twelve years.

5. That the powers and duties with regard to vaccination should be transferred from the Poor Law to the Sanitary Authorities.

6. That the Government should pay for vaccination performed by General Medical practitioners, subject to the vaccination being done in accordance with the regulations of the Local Government Board, and being open to inspection.

At a later stage of the Bill, when the clause relating to conscientious objectors was introduced into the Bill, the Council urged upon several influential members of the House of Lords the danger threatened to public health by the introduction of the clause. A fair measure of support was promised to the views supported by the Institute, but as is well known the clause was eventually inserted in the Bill.

SESSIONAL MEETINGS.

Sessional Meetings for the discussion of subjects of Sanitary interest were held in February, March, April, and December, and the following subjects were brought forward:—

"Purification of Water for Barracks, Prisons, and other Institutions." Prof. J. LANE NOTTER, M.A., M.D.

"Waterborne Typhoid Fever." CHRISTOPHER CHILDS, M.A., M.D., D.P.H.

"The desirability of making Watershed Areas and Sanitary Districts coterminous." R. E. MIDDLETON, M.INST.C.E., M.INST.M.E.

"Some prevalent fallacies in Vital Statistics." EDWARD F. WILLOUGHBY, M.D., D.P.H.

The papers read during the early part of the year, with the discussions upon them, have already appeared in the Journal, Vol. XIX. The paper by Dr. E. F. Willoughby will be published in Part I. of the Journal for 1899.

These meetings afford an opportunity for an interchange of opinions amongst the Members and Associates of the Institute, and the Council will be glad to receive from time to time notice of any subjects which are thought desirable for discussion.

LECTURES AND DEMONSTRATIONS ON SANITARY SCIENCE.

The twenty-fifth and twenty-sixth courses of Lectures and Demonstrations were held during the year in London. In February and March 65 Students entered their names, and in October and November 54 Students.

A complete list of the Lectures has been given in Vol. XIX. of the Journal.

Technical Exhibitions are awarded by the Technical Education Board of the London County Council to the annual value of five pounds, which may with the approval of the Board, be applied to paying the expenses of students in attending these lectures.

INSPECTIONS AND DEMONSTRATIONS.

To make the course of training given by the Institute as practical as possible, arrangements were made for the Students to visit the places mentioned below in order that they might have the opportunity of observing and noting the difficulties that have to be met in the practical application of Sanitary principles to various trade processes.

he names of the gentlemen who arranged the visits and conducted e students are also given:—

East London Water Works, Lee Bridge. By kind permission of W. B. Bryan, M.INST.C.E., Engineer to the Company, who conducted the Students.

Friern Barnet Sewage Works. By kind permission of E. J. Reynolds, ASSOC.M.INST.C.E., Surveyor to the District Council, who conducted the Students.

Barking Sewage Outfall Works. By kind permission of J. E. Worth, M.INST.C.E., District Engineer, London County Council, who conducted the Students.

Southwark and Vauxhall Water Works, Hampton. By kind permission of J. W. Restler, M.INST.C.E., Engineer to the Company.

Demonstration in Book-keeping, as carried out in a Sanitary Inspectors' Office, in the Parkes Museum. Albert Taylor, Chief Sanitary Inspector of St. George's, Hanover Square.

East London Soap Works. By kind permission of Messrs. E. Cook & Co.

Morden Hall Dairy Farm. By kind permission of, and conducted by, the proprietor, Mr. Oscar J. White.

Aylesbury Dairy Co, By kind permission of J. A. Hattersley, Managing Director (2 inspections).

Ealing Sewage and Destructor Works. By kind permission of Chas. Jones, M.INST.C.E., Engineer and Surveyor to the District Council (2 inspections), who conducted the Students.

Beddington Sewage Irrigation Farm, Croydon. By kind permission of Thos. Walker, M.INST.C.E., Borough Engineer, who conducted the Students.

Express Dairy Company's Farm, College Farm, Finchley. By kind permission of G. Titus Barham, Managing Director, who conducted the Students.

Wimbledon Sewage Works and Farm. By kind permission of C. H. Cooper, ASSOC.M.INST.C.E., Engineer and Surveyor to the District Council, who conducted the Students.

Knacker's Yard. By kind permission of Harrison & Barber (2 inspections).

Metropolitan Cattle Market. By kind permission of the Corporation of the City of London. Conducted by W. A. Bond, M.A., M.D., D.P.H., Medical Officer of Health, Holborn.

Disinfecting and Filtering Appliances at the Lambeth Disin-

fecting Station. By kind permission of Dr. JOSEPH PRIESTLEY, M.O.H. Conducted by WOLF DEFRIES, B.A.

Disinfecting Station, Chelsea. By kind permission of LOUIS PARKES, M.D., D.P.H.LOND., Medical Officer of Health, Chelsea Vestry (2 inspections), who conducted the Students.

St. George's, Hanover Square, Sanitary Works in different stages of progress, Disinfecting Station, Mortuary, &c., Model Dwellings (Gatliff Buildings), and Routine Office Work of a Sanitary Inspector. By kind permission of the Vestry. Conducted by A. TAYLOR, Chief Sanitary Inspector (4 inspections).

London County Council's Common Lodging House, Parker Street, Drury Lane, by kind permission of the L.C.C. Conducted by FRANK J. RUDDLE, Estates and Valuation Dept., L.C.C. (2 inspections).

Kingston Sewage Works. By kind permission of, and conducted by, the Manager, T. STEVENS.

St. Pancras Destructor Station. By kind permission of, and conducted by, the Surveyor, W. NISBET BLAIR, M.INST.C.E.

Richmond Main Sewage Works. By kind permission of W. FAIRLEY, ASSOC.M.INST.C.E., Engineer, who conducted the Students.

Disinfecting Apparatus and Model Steam Laundry. By kind permission of W. G. LACY (2 inspections), who conducted the Students.

Demonstration of Diseased Meat in the Parkes Museum. by W. A. BOND, M.A., M.D., D.P.H., Medical Officer of Health, Holborn.

During the period over which each course of Lectures extended the Students had the free use of the Library and Museum at all times when they were open, and special times were set apart during each week for the Students to examine the Museum with the assistance of the Curator.

The Council desire to record their sincere thanks to the Lecturers for the great benefits they have conferred upon the Students, and for the assistance they have given to the diffusion of Sanitary knowledge by the preparation and delivery of these Lectures, and also to those gentlemen who took so much trouble to make the various inspection and demonstration visits instructive to the Students.

The Institute is also indebted to the London Vestries and District Boards and others who are so kindly assisting them with regard to the visits, and in bringing the lectures under the notice of their officers.

EXAMINATIONS.

In Practical Sanitary Science.

Examinations were held at the following places: London (2 Examinations), Birmingham, Belfast, Cardiff, Exeter, Leeds, Liverpool, Manchester. 41 Candidates presented themselves, to 18 of whom Certificates were granted.

For Sanitary Inspectors.

Examinations were held at the following places:—

Birmingham.	Leeds.
Belfast.	Liverpool.
Cardiff.	London (2 Examinations).
Exeter.	Manchester.
Glasgow.	Newcastle-upon-Tyne.

At these Examinations 591 Candidates presented themselves, and 329 were certified competent, as regards their Sanitary knowledge, to discharge the duties of an Inspector of Nuisances under the Public Health Act, 1875, or of a Sanitary Inspector under the Public Health (London) Act, 1891.

The Examinations were established in 1877, and the following figures show the total number of Examinations held, and the number of candidates:—

	Examinations.	Candidates Entered.	Candidates Certificated.
For Local Surveyors	35	291	142
Practical Sanitary Science....	24	200	101
Sanitary Inspectors	107	4,924	2,822
	166	5,415	3,065

A Table and Diagram relating to these Examinations is given on the following page.

The scheme before the Local Government Board for the formation of a Sanitary Inspectors' Examination Board, composed of representatives from various Societies, was still under consideration at the end of the year.

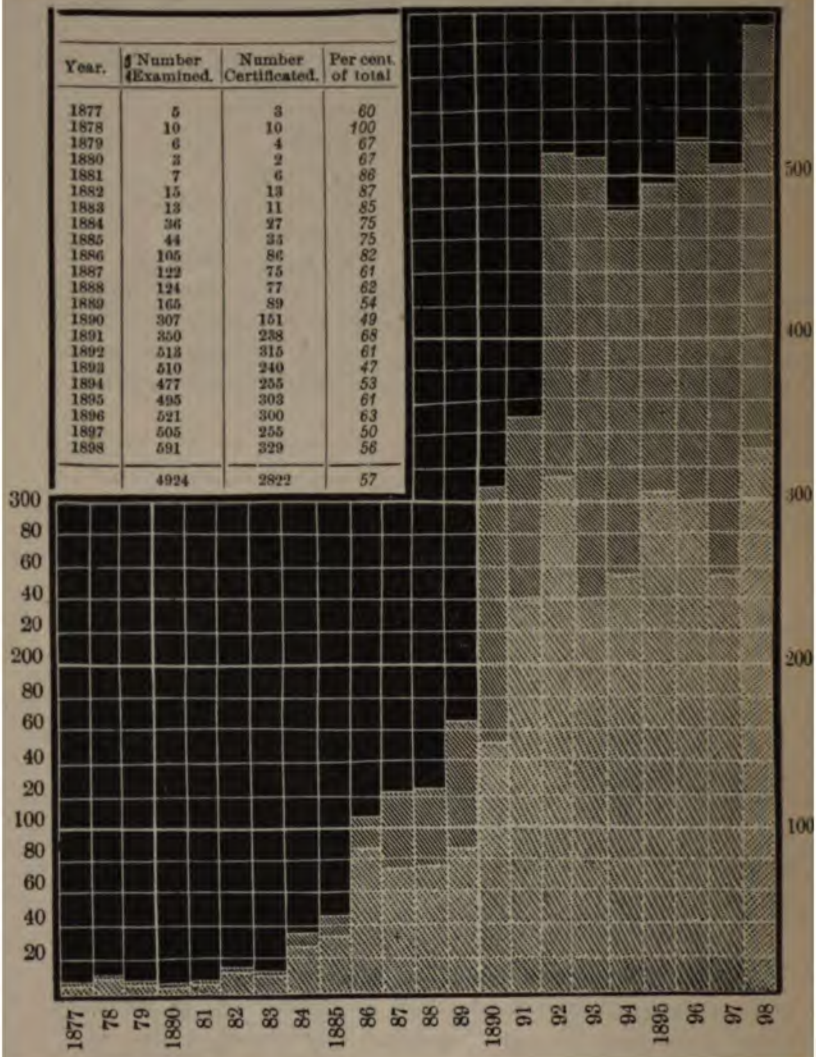
CONGRESS AND EXHIBITION.

The Seventeenth Congress and Exhibition of the Institute was held at Birmingham from September 27th to October 1st, by invitation of the Right Hon. The Lord Mayor and City Council.

Very suitable accommodation was provided for the meetings of the Congress in the Town Hall, Mason University College, and the Birmingham and Midland Institute.

Table and Diagram showing the number of Candidates examined and certified each year. Relating to Inspectors' Examination only.

Year.	Number Examined.	Number Certificated.	Per cent. of total
1877	5	3	60
1878	10	10	100
1879	6	4	67
1880	3	2	67
1881	7	6	86
1882	15	13	87
1883	13	11	85
1884	36	27	75
1885	44	33	75
1886	105	86	82
1887	122	75	61
1888	124	77	62
1889	165	89	54
1890	307	151	49
1891	350	238	68
1892	513	315	61
1893	510	240	47
1894	477	255	53
1895	495	303	61
1896	521	300	63
1897	505	255	50
1898	591	329	56
	4924	2822	57



NOTE.—The total number of Candidates is shown by the whole height of the column shaded, and the number who have obtained Certificates by the lighter portion.

Delegates were appointed by 431 Sanitary Authorities and learned Institutions.

The numbers attending the Congress were as follows:—Members of Council, 22; other Members and Associates of the Institute, about 527; Associates of the Congress, 400; Delegates, 880; Press and Complimentary Tickets, 150; making a total attendance of over 1,979.

Fourteen meetings were held during the Congress, and at these 67 addresses and papers were read, and fully discussed.

The meetings were divided into three Sections, meeting on the Thursday and Friday,

1. Sanitary Science and Preventive Medicine,
2. Engineering and Architecture,
3. Physics, Chemistry, and Biology;

and Conferences were arranged for Municipal Representatives, Medical Officers of Health, Municipal and County Engineers, Sanitary Inspectors, Ladies on Domestic Hygiene.

Among the subjects of special interest brought forward and discussed at the meetings may be mentioned:—

The Housing of the Working Classes.

Bacteriology, both in relation to disease and to the disposal of sewage.

District nursing and the care of children.

Tuberculosis.

House drainage and sewage disposal, and a long and elaborately illustrated paper on the works now being carried out for the supply of water to Birmingham from the Welsh Hills.

Most of the papers and discussions are published in the Journal of the Institute.

Interesting visits were made to the present water supply works, the sewage farm, meat market, and other municipal works illustrating the sanitary administration of a large city. These visits, under the guidance of the responsible officers, are of great value to the members, and especially to the officers and members of local authorities and officials appointed as delegates to the Congress.

In addition to these a number of visits were arranged to the typical manufactories of Birmingham, and well organised excursions of a social character were carried out by the Local Committee to Dudley Castle, Malvern, Stratford-on-Avon, and other places near Birmingham.

The Health Exhibition was held in Bingley Hall, and was open twenty-three days. It was attended by 85,000 visitors. A list of the Exhibits, to which medals were awarded, is given in Part III.

of the Journal for 1898, and also a list of certain Exhibits which required special tests in London or elsewhere before their merits could be decided upon by the Judges.

The Exhibition was the largest and most comprehensive that has been held by the Institute, and occupied an important place in the teaching work of the Congress—illustrating many of the points discussed at the meetings. It is also found that these Exhibitions are of much educative value to the makers of sanitary appliances, as they see collected together the inventions and appliances from all parts of the country, and the decisions and awards of the Judges indicate which of these are approved and considered satisfactory.

The Illustrated List of Exhibits, to which awards have been made, has been regularly published by the Institute since 1892. During the year an edition of 500 was specially printed and circulated to Managers of Public Departments, Railways, Hotels, &c., both at home and abroad. The list now contains illustrations, descriptions, and prices of a large number of sanitary appliances and articles of domestic use and economy, and is, the Council believe, of much use for reference.

An interesting feature in the Exhibition was the Demonstrations of the Rontgen X Rays, Kromscop, and the Cinematograph. Among other Demonstrations and Competitions were Plumbing Work, Cookery, Nursing, and Physical Drill.

Those who assisted have since received Letters of Thanks from the Exhibition Committee, and their names are given in the following list:—

Deaf and Dumb Institute (E. Townsend, Headmaster).
Committee, Protestant Dissenting Charity School.
Birmingham Athletic Institute.
Blind Institution.
Brookfields Board School, Boys.
Summerfield Board School, Boys.
Bloomsbury Board School, Boys.
Dolobran Athletic Club (G. L. Platnauer).
Gower Street Board School, Girls, Aston.
Mary Street Board School, Girls.
Gem Street Industrial School.
Allcocks Street Girls' School.
National Society's Training School of Cookery.
The Birmingham & Midland Counties Training School for Nurses.
Messrs. Doulton and Co.

EXHIBITIONS HELD IN CONNECTION WITH THE CONGRESSES OF THE INSTITUTE.

	1877. Leamington.	1878. Stafford.	1879. Croydon.	1880. Exeter.	1882. Newcastle.	1883. Glasgow	1884. Dublin.	1885. Leicester.	1886. York.	1887. Bolton.	1889. Worcester.	1890. Brighton.	1892. Portsmouth.	1894. Liverpool.	1896. Newcastle.	1897. Leeds.	1898. Birmingham.
Exhibitors ...	117	116	189	106	110	126	134	135	130	112	108	108	156	146	100	145	197
Exhibits ...	294	319	710	500	600	750	900	1,000	900	800	800	1,000	2,000	—	—	—	
Space occupied (in sq. ft.)	—	—	—	9,725	14,520	20,000	40,000	30,000	30,000 and Gr'nds	25,000	28,000 and Gr'nds	30,000 and Gr'nds	35,000 and Gr'nds	25,000	17,310 and Gr'nds	42,000	54,000
Days Exhibition was open ...	14	16	17	19	25	25	19	17	26	29	23	18	24	24	22	23	23
Total Visitors	—	—	—	8,955	8,373	20,000	35,000	37,000	30,000	27,000	23,000	35,000	49,000	48,189	51,000	75,790	85,000
Medals or Silver Medals.	13	13	12	12	15	21	18	34	16	14	30	32	21	29	9	14	18
Special Certificates ...	None.	6	9	7	4	13	11	11	12	9	Discon	tinued					
Certificates or Bronze Med'ls	None.	22	38	40	72	58	83	79	64	40	71	88	76	56	52	41	65
Exhibits deferred for further trial	—	7	52	30	37	44	39	119	42	46	67	67	38	59	44	26	30

Messrs. Baylis and Inman.
The Water-works Committee, Birmingham.
The Gas Department, Birmingham.
The Sanitary Department, Birmingham.

A Table relating to these Exhibitions is given on the preceding page.

The Septic treatment of sewage which has for some time engaged the attention of sanitary authorities, and has been the subject of discussion at several meetings of the Institute, came before the Judges for examination as an exhibit at the Exhibition of the Institute. As it appeared to the Council to be a matter of considerable importance a special sub-committee was appointed to carry out investigations, and these are not yet completed.

PARKES MUSEUM.

The number of Students visiting the Museum under the guidance of Teachers and Professors shows a large increase, as will be seen by the following table.

Table showing the number of Classes and Students visiting the Museum.

Date.	Institutions from which Classes attended.	Classes.	Students.
1892	13	68	854
1893	21	87	1043
1894	28	48	865
1895	50	93	1695
1896	49	82	1435
1897	53	138	1674
1898	47	97	1958

This Table shows an increasing use of the Museum for this purpose.

The following is a list of the various Institutions from which Classes were arranged to visit the Museum.

Aldersgate Street Polytechnic.
Brighton Training College.
Borough Polytechnic.
Blackheath Pupil Teachers' Centre.
Battersea Polytechnic.
Bedford College.
College of Preceptors.
Croydon Polytechnic.
Clyde Street Science Centre.
Cheltenham School of Science.
Charing Cross Hospital.
City of London College.
Convent School, Clarendon Sq.
Deptford Science School.
Dudding Hill Board School.
Droop Street Board School.
Fleet Road Board School.
Guy's Hospital.
Green Coats School.
Home and Colonial Teachers' Centre.
King's College.
London Hospital.
Montem Street Board School.
Maria Grey Training College.
National Health Society.
Northern Polytechnic.
National Training College.

Physical Training College (Mdme. Osterberg's).
Peckham Pupil Teachers' Centre.
Post Graduates.
Queen's Jubilee Nurses Institute.
Regent Street Polytechnic.
Royal Veterinary College.
Stockwell Road Board School.
St. Bartholomew's Hospital.
South Norwood Polytechnic.
South Place Ethical Society.
St. Thomas' Hospital.
St. Mary's Hospital.
School of Military Engineering, Chatham.
Thornton Heath Institute.
Trades' Institute, Titchfield Street.
University College.
Woolwich Polytechnic.
William Street Science Centre.
Westbourne Park Institute.
Wesleyan Training College (Girls').

The additions to the Museum include several specimens of old pipes, among which the large pipe cut out of solid stone removed from St. James' Square, and the canvas and paper drain pipes from the neighbourhood of Canterbury are interesting, also several specimens of diseased meat and animal parasites.

An installation of two closets has been fitted up, representing ground and first floor closets, connected to a ventilated soil pipe with anti-siphonage pipes to each, but so arranged that either the ventilation or anti-siphonage pipes may be closed or opened at will. The traps or basins of either closet can also be exchanged, so that by these means experiments in relation to flushing ventilation, momentum, and siphonage, can be readily carried out, and already some interesting facts have been ascertained.

The loan of Lantern Slides has slightly increased, and several lecturers in the provinces have testified to the usefulness of this section of the Institute's work by their remarks on returning slides, both as to the help to themselves personally, and the appreciation by their audiences.

The number of slides loaned in 1898 was 726 against 635 in 1897.

LIBRARY.

Volumes and Pamphlets numbering 380 have been presented to the Library. Lists of these are published in Vol. XIX. of the Journal.

About 600 references were made to the shelves by readers during the year.

For the convenience of Members, Associates, and Students who wish to borrow books for home reading, special arrangements have been made for the loan to them, at a small fee, of books from Lewis's Medical and Scientific Library, which contains a large number of recent text books and standard Sanitary works.

JOURNAL.

The Journal has been enriched by additional matter which, al involving some expense and considerable labour, will, the (believe, be found valuable for reference and of much use Members and Associates. The principal Journals and periodica nected with Public Health both English and Continental are ca looked through, and all papers and articles of interest to Sani are noted, with a brief indication of the scope of the article. titles are published in a classified list each quarter, and the themselves filed in the Library for reference.

The number of titles noted during the year is 217, being s from some 25 English and 20 Foreign periodicals.

This arrangement will enable members who have not time or tunity to peruse the various periodicals to keep themselves in of writings on any subject in which they are specially intereste

The Council desire to record their thanks to the members of cil, and others who have voluntarily undertaken the task of exa these papers and selecting the titles.

It has also been arranged to file in the Library the best obtainable of all cases coming before the Law Courts for de and the Council of Law Reporting has given the Institute pern to print in the Journal the epitome of the cases and abstra the reports; a reference will also be given to the full text case in the Law Reports filed in the Library.

FINANCE.

The statement of Income and Expenditure shows a very satis financial condition for the year. The Establishment Charg practically the same as in 1897, and the General Receipts ha creased by £110. Under the Special Expenses the Journal, has already been referred to as having been increased in variou is now costing the Institute considerably more than in previous and the reason for the increase in the cost of the Illustrated Premiated Exhibits, and the expense involved in experiments Septic Tank have also been referred to in other parts of the The income derived on the various special receipts shows a co

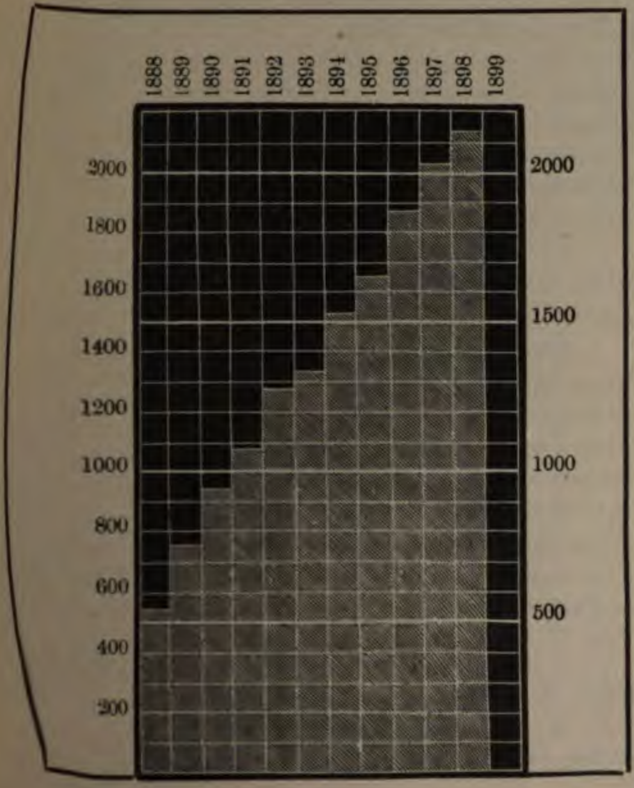
fees for Fellows, Members, and Associates, but as these fees only applied to a limited number of those elected, they do not consider that it will prove a financial loss to the Institute.

EPITOME OF REGISTERS OF MEMBERS AND ASSOCIATES.

The comparison of the roll of the Institute with the preceding year shows a steady increase in the number of Members and Associates.

	Hon. Fellows.	Fellows.	Members.	Associates.	Total.
Dec. 31st, 1897	28	150	708	1142	2028
Dec. 31st, 1898	30	146	768	1186	2130

Diagram showing the Yearly Increase in the Roll of the Institute.



OBITUARY.

It is with regret that the Council have to report the death
GRACE THE DUKE OF NORTHUMBERLAND, K.G., P.C., who was t
President of the Institute in 1876, and retired under the Arti
Association in 1891, Sir R. RAWLINSON, K.C.B., Vice-President,
BASS, M.P., J. J. COLMAN, W. ILIFFE, M.R.C.S., C. J. LEAF,
F.S.A., Prof. T. HAYTER LEWIS, F.S.A., F.R.I.B.A., J. PAGET, J.
Col. G. E. WARING, Jun., M.INST.C.E., *Fellows;* Dr. C. J.
Surg.-General Sir J. MOUAT, C.B., F.R.C.S., Sir R. QUAIN, M.D.,
and J. WHITE, ASSOC.M.INST.C.E., *Members;* E. W. FRICKER,
JACKSON, S. G. E. LEE, E. E. RAY, A. SCALES, and F. R. T
Associates.

EPITOME OF THE WORK OF THE INSTITUTE, 1

LONDON LECTURES AND EXAMINATIONS.

		At
4	Sessional Meetings for discussion of Sanitary subjects ..	
36	Lectures to Sanitary Officers	
4	Special Demonstrations, Inspection of Meat	
30	Practical Demonstrations for Sanitary Officers	
2	Examinations in Practical Sanitary Science	
2	Examinations Sanitary Inspectors	
97	Classes brought to the Museum	
	Other persons visiting the Museum *(Estimated)*	

PROVINCIAL EXAMINATIONS.

7	Practical Sanitary Science	
9	Examinations Sanitary Inspectors	

CONGRESS AND EXHIBITION AT BIRMINGHAM.

6	Sectional Meetings	
5	Conferences	
3	Addresses and Lectures	
	Exhibition open for twenty-three days, at which a number of Lectures and Demonstrations were given	

It will be seen from this general epitome what a large fi
work of the Institute now covers, and the members will feel th
progress is being made in the Objects which the Institute de
accomplish.

DOUGLAS GALTON, K.C.B.
Chairman of Cou

E. WHITE WALLIS,
Secretary.

March 8th, 1899.

GENERAL BALANCE SHEET, 31st DECEMBER, 1898.

Liabilities.	£	s.	d.
To Fees and Subscriptions paid in advance for 1899	81	19	6
„ Life Composition Fund	365	8	0
„ Library Catalogue Account	98	2	9
„ Sundry Creditors	846	0	8
„ Balance of Assets over Liabilities	12,070	14	5
	£13,462	5	4

Assets.	£	s.	d.	£	s.	d.
By Leases of Premises, Library and Contents of Museum, Furniture and Publications	1,624	18	11			
„ Subscriptions in Arrear and Sundry Debtors	243	7	3			
„ Cash in hand and on Deposit	1,889	17	2			
				3,758	3	4
„ Investment in 2¾% Consols, Amount at December, 1898	7,452	15	0			
„ „ 3°/₀ India Stock	1,095	1	0			
„ „ 3½% „ „	1,156	6	0			
				9,704	2	0
				£13,462	5	4

Examined with the Books and Accounts and found correct,

W. COLLINGRIDGE, M.D.
ALFRED LASS WOOD & CO., *Chartered Accountants,* } *Auditors.*

6th *March*, 1899

STATEMENT of INCOME and EXPENDITURE

DR. EXPENDITURE.	£	s.	d.	£	s.	d.
Establishment Charges:—						
To Rent, Rates, Taxes, and Insurance	426	1	3			
" Salaries and Wages	1,110	13	4			
" Coals, Lighting, and Care of Offices	96	6	5			
" Repairs, Alteration, and Arrangement of Museum	163	16	10			
" Library, Binding, &c.	13	8	7			
" Po[illegible]age and Carriage	169	1	4			
" Pri[illegible]ing, Stationery, and Advertising	212	1	9			
" Int[illegible]	75	8	0			
" Law Ch[illegible]	2	17	0			
" Office F[illegible]re	8	17	7			
" Depreciati[illegible] of Leaseholds	75	0	0			
				2,353	12	1
Special Expenses, exclusive [illegible]lishment Charges:—						
To Journal and Publication[illegible] of Printing, etc., less Sales an[illegible]isements	520	0	7			
" Sessional Meetings	16	0	6			
" Lectures, Sanitary C[illegible]	136	0	8			
" Examination Expen[illegible]	783	13	2			
" Congress	455	4	5			
" Exhibition	2,708	15	4			
" Illustrated List of Premia[illegible]hibits	107	9	3			
" Investigations on the Sept[illegible]k	37	5	0			
				4,764	8	11
				7,118	1	
Balance, Excess of Income over Expenditure for the year 1898, carried over				1,655	4	1
				£8,773	5	1

Balance to be carried forward £12,070 14 5

for the Year ended 31st December, 1898.

INCOME.	£	s.	d.	Cr. £	s.	d.
General Receipts:—						
By Annual Subscriptions	1,433	16	0			
" Entrance Fees	30	9	0			
" Fellowship Fee	26	5	0			
" Donation	2	2	0			
" Interest on Investments, etc.	237	9	7			
				1,730	1	7
Special Receipts:—						
" Lectures, Sanitary Officers	161	7	1			
" Examinations	2,212	10	6			
" Publications—Farr's and Simon's—Profit on Sales	1	11	3			
" Illustrated List of Premiated Exhibits	6	13	1			
" Congress at Birmingham	274	4	1			
Exhibition " "	4,386	17	6			
				7,043	3	6
				£8,773	5	1

	£	s.	d.
By Balance brought forward from last account (1897)	10,415	10	4
" Balance for the year 1898 brought down	1,655	4	1
	£12,070	14	5

MEETINGS HELD, JANUARY TO MARCH, 1899.

LECTURES AND DEMONSTRATIONS TO SANITARY OFFICERS.

The Twenty-Seventh Course of Lectures and Practical Demonstrations, and Visits of Inspection to Trade Premises and Refuse Disposal Works, commenced on February 20th. 53 Students entered their names for this Course.

SESSIONAL MEETINGS.

Meetings were held as follows: on February 8th a discussion was opened by R. E. Middleton, M.Inst.C.E., on "The Supply of Water to London by the Welsh Scheme," Sir Douglas Galton, K.C.B., D.C.L., LL.D., F.R.S., in the chair; on March 8th on "The Establishm[illegible]attoirs in the Metropolis in relation to the Preve[illegible]erculosis," by William Arthur Bond, M.A., M.D., B.S[illegible].O.H., Holborn, E. B. Forman, M.D., Member of Lond[illegible]uncil, in the chair. The papers and discussions will be print[illegible]t II., Vol. XX.

EXA[illegible]IONS.

At an Examination in Prac[illegible]nitary Science, held at Bristol on February 10th and 11th, 18[illegible]Candidate presented himself.

At an Examination for Inspector[illegible]f Nuisances, held at Bristol, on February 10th and 11th, 1899, under the Public Health Act, 1875, 8 Candidates presented themselves.

The following 5 Candidates were certified, as regards their Sanitary Knowledge, competent to discharge the duties of Inspectors of Nuisances under the Public Health Act, 1875:—

1899, Feb. 11. COLEMAN, WILLIAM JOHN, 339, Cardiff Road, Aberaman, Aberdare.
1899, Feb. 11. HODDINOTT, EDWARD, Stratton, St. Margaret, Wilts.
1899, Feb. 11. ORD, WILLIAM, 17, Cambridge Gardens, Hanwell.
1899, Feb. 11. PENWILL, FRANK, Park Vale, Cockington, Devonshire.
1899, Feb. 11. THATCHER, HARRY EUSTACE ALFRED, Hampton Court Palace, W.

Examination Questions.

Practical Sanitary Science.—Bristol, February 10th & 11th, 1899.

PAPER I.

1. Reduce to 0° C and 760 millimeters, 80 cubic centimetres of gas at 8° C and 740 millimetres.

2. What is meant by specific heat? What bearing has the specific heat of Water on the climate of seaside places?

3. What is the composition of coal gas? What impurities does its complete or faulty combustion add to the air of an inhabited room? How does this influence the question of ventilation of dwelling rooms?

4. Explain what is meant by "watershed," "gathering ground," "dip," "fault," "percolation," and "spring."

PAPER II.

5. What are the different kinds of timber used in building construction? For what class of work are they respectively used, and what defects are to be avoided in their selection?

6. What is the general character of moorland water, and what purification does it require before use for drinking purposes? Has it any particular action on pipes and cisterns?

7. Describe briefly, with sketches, the following kinds of W.-C. apparatus, and state their advantages and disadvantages respectively —(a) Wash-out; (b) Short-hopper; (c) Siphonic.

8. Describe two ways of dealing with—(a) house sewage; (b) house refuse.

The Candidate was examined vivâ voce *on the* 11*th.*

Inspector of Nuisances.—Bristol, February 10th and 11th, 1899.

1. What are the principal provisions of the Dairies, Cowsheds, and Milkshops Order? By whom is this Order enforced, and under what Act?

2. In the inspection of meat, in the carcasses of what animals would you look for tuberculosis? In what parts of the carcasses would you be most likely to find it, and what would be the appearances if present?

3. Explain in detail the way in which you would inspect a house, with a view to its registration as a common lodging house.

4. How would you disinfect a room with—(a) formalin tabloids; (b) sulphur; and (c) corrosive sublimate? Explain your answers fully.

5. In examining the drainage of an old house a soil drain is found to pass through and leak into an underground water cistern. How would you reconstruct this drain, it being impossible on account of surrounding buildings to divert it? The cistern must be retained. Illustrate by sketches.

6. Describe the conditions which require to be complied with in the construction of a Water Closet soil pipe; and house drain, to ensure their all being preserved in a sanitary condition. Give sketch to illustrate the several points.

7. Describe the various methods of jointing stoneware drain pipes, and state the advantages and disadvantages of each.

8. What is the average amount of house refuse per head per annum collected by local authorities in any large town? What the best means of storing, collecting, and disposing of such refuse?

The Candidates were examined vivâ voce *on the 11th.*

At an Examination in Practical Sanitary Science, held at Glasgow on March 10th and 11th, 1899, one Candidate presented himself, to whom a Certificate was granted:—

1899, Mar. 11. KNEWSTUBB, JOSEPH JOHN, Pembroke Street, Appleby, Westmoreland.

At an Examination for Inspectors of Nuisances, held at Glasgow on March 10th and 11th, 1899, 14 Candidates presented themselves.

The following 6 Candidates were certified, as regards their Sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances under the Public Health Act, 1875:—

1899, Mar. 11. *L* MARWICK, Miss ALICE, Royal Infirmary, Glasgow.
1899, Mar. 11. McCAA, JOHN, Stirling Castle, N.B.
1899, Mar. 11. REID, ANDREW LISTER, Market Square, Bowness, N.B.
1899, Mar. 11. RODDAN, THOMAS KERR, 22, Panmure Place, Edinburgh.
1899, Mar. 11. STIRLING, JAMES MILLER, Glentirran House, Kippen Station, N.B.
1899, Mar. 11. TURNBULL, JOHN, Firs, Bannockburn, N.B.

Examination Questions.

Practical Sanitary Science.—Glasgow, March 10th and 11th, 1899.

PAPER. I.

1. What is the law of "Capillarity"? State some of the most important phenomena in which it comes into play.

2. How would you calculate the velocity of water escaping from orifices at varying depths below the surface? Explain what is meant by the "vena contracta" and how it influences the amount of the discharge.

3. What is the nature of the chemical changes attending the action of water upon lead? How would you test for lead in a sample of drinking-water.

4. What are the causes of fluctuations in level of subsoil water? What is the effect of such fluctuations upon the healthiness of the locality in which they occur?

Paper II.

5. Make sketches showing the construction of a filter for a public water supply for a population of 2,000 persons. State the maximum rate of filtration which in your opinion ought to be allowed.

6. State the relative advantages and disadvantages of covering service reservoirs, or of leaving them uncovered.

7. State the conditions under which it is desirable to use concrete in connection with (*a*) stoneware and (*b*) iron drains. Give sketches of how it should be used in each case.

8. In selecting a site for a sewage farm, what points would you chiefly look to? and where the area is limited what methods may be adopted to improve the capacity of a farm.

The Candidate was examined vivâ voce *on the* 11*th.*

Inspectors of Nuisances.—Glasgow, March 10th and 11th, 1899.

1. What powers do Sanitary Authorities possess to check the spread of small-pox through the agency of canal boats? Specify the statutes under which they should act.

2. State generally the requirements of the Model By-Laws of the Local Government Board with respect to house drains.

3. Enumerate and explain the advantages of steam disinfection over disinfection by dry air.

4. State shortly the methods used in the manufacture of glue. From what processes do effluvia arise? How can the nuisance be remedied.

5. What precautions must be taken to prevent dampness in the walls of a house in localities where the subsoil water is liable to very extensive fluctuations in level?

6. What are the chief causes of pollution to sources of water supply, and how may water be polluted in course of distribution to the consumers?

7. What should be the size of a lead pipe used as a bath waste? Is it necessary to provide a trap to same when the outlet is through the external wall delivering on to an open down-pipe head? Explain your reasons fully.

8. State the reasons why drains should not be connected with cellars. What precautions should be taken where such connection is unavoidable?

The Candidates were examined vivâ voce *on the* 11*th.*

FORTHCOMING MEETINGS.

Calendar, April to July, 1899.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m., except August and September.

Special Purposes Committee .	. Third Monday at 5 p.m.
Finance Committee . .	. Second Wednesday at 4.30 p.m.
Exhibition Committee . .	. First Monday at 5 p.m.
Congress and Editing Committee	. Second Monday at 5 p.m.
Museum and Library Committee	. Fourth Monday at 5 p.m.
Parliamentary Committee .	. As occasion requires.
Rivers Pollution Committee .	. As occasion requires.

APRIL.

10 M. Lecture to Sanitary Officers at 8 p.m. Sanitary Building Constru-tion, by Edwin T. Hall, F.R.I.B.A.

12 W. **Sessional Meeting at 8 p.m.** Discussion on Practical Hygie- Teaching in Elementary Schools, to be opened by Miss A. Ravenh-

12 W. Inspection and Demonstration at Chelsea Disinfecting Station, 3 p.m., conducted by Dr. Louis Parkes.

13 Th. Lecture to Sanitary Officers at 8 p.m. House Drainage, by W. Tyndale, M.INST.C.E.

14 F. } Examinations in Practical Sanitary Science and for Inspectors
15 S. } Nuisances, Birmingham.

15 S. Inspection and Demonstration at the Beddington Sewage Farm, about 3 p.m., conducted by the Engineer and Surveyor, Thomas Walker, M.Inst.C.E.

17 M. Lecture to Sanitary Officers at 8 p.m. Sanitary Appliances, by G Reid, M.D., D.P.H., Med. Officer of Health, Staffordsh. County Counci

19 W. Inspection and Demonstration in the Parish of St. George, Hanove Square, at 2 p.m. (limited), conducted by Albert Taylor, Chie Sanitary Inspector.

20 Th. Lecture to Sanitary Officers at 8 p.m. Details of Plumbers' Work, b J. Wright Clarke.

22 S. Inspection and Demonstration at the Ealing Electric Light Statio Refuse Destructor, Sewage Works, &c., at 2.15 p.m., conducted b the Engineer and Surveyor, Charles Jones, M.Inst.C.E.

24 M. Lecture to Sanitary Officers at 8 p.m. Sewerage and Sewage Di posal, by Prof. Henry Robinson, M.INST.C.E.

27 Th. Lecture to Sanitary Officers at 8 p.m. Scavenging. Disposal House Refuse, by Charles Jones, M.INST.C.E., Engineer and Sur veyor, Ealing Urban District Council.

29 S. Inspection and Demonstration at Barking Sewage Outfall Works, 3 p.m., conducted by the District Engineer, L.C.C., John Ed. Wor M.Inst.C.E.

MAY.

2 T. Dinner of the Institute at the Whitehall Rooms, H.R.H. The Duk of Cambridge in the Chair, at 7 p.m.

5 F. } Examinations in Practical Sanitary Science and for Inspectors
6 S. } Nuisances, London.

JUNE.

9 F. } Examinations in Practical Sanitary Science and for Inspectors
10 S. } Nuisances, Belfast.

23 F. } Examinations in Practical Sanitary Science and for Inspectors
24 S. } Nuisances, York.

JULY.

7 F. } Examinations in Practical Sanitary Science and for Inspectors
8 S. } Nuisances, Cardiff.

28 F. } Examinations in Practical Sanitary Science and for Inspectors
29 S. } Nuisances, Liverpool.

HONORARY FELLOWS, FELLOWS, MEMBERS, AND ASSOCIATES ELECTED.

From JANUARY to MARCH, 1899, inclusive.

(A complete list can be had on application.)

HONORARY FELLOWS.

41 1899. Jan. PISTOR, M., M.D., *Ausbacher Mtasse*, 14, *Berlin*.
42 1899. Jan. ROGERS, J. G., M.D., *Pasha, Sanitary Service, Cairo, Egypt.*
43 1899. Jan. RUYSCH, W. P., M.D., *Ministère de l'Interieur, Amsterdam.*
44 1899. Jan. SALTET, R. H., M.D., *Amsterdam.*
45 1899. Jan. TRÉLAT, ÉMILE, 17, *Rue Deufert-Rochereau, Paris.*

FELLOWS.

1073 1899. Feb. HIS GRACE THE DUKE OF NORTHUMBERLAND, P.C., *Alnwick Castle, Northumberland.*
1067 1899. Feb. BICKNELL, Robert Henry, M.INST.C.E., 11, *Oppidans Road, London, N.W.*
200 1899. Feb. SCOTT-MONCRIEFF, W. D., 14, *Victoria Street, S.W.*

MEMBERS.

* Passed the Examination of the Institute in Practical Sanitary Science.

1339 1899. Feb. *BALL, William John, 17, *Wellfield Street, Warrington.*
1340 1899. Jan. BOWEN, Thomas Gordon, *Penygraig Penclawdd R.S.O.*
1349 1899. Jan. BROCKHOLES, William Fitzherbert, *Claughton-on-Brock, Garstang.*
1353 1899. Mar. CAMERON, J. Spottiswoode, M.D., B.SC., C.M.EDIN., M.R.C.S., M.O.H., *Town Hall, Leeds.*
1356 1899. Jan. CHEYNE, Robert, D.P.H., L.R.C.S.EDIN., L.S.A.LOND., *Edgefield, York Road, West Norwood.*
1361 1899. Jan. DELLAGANA, William Augustus, F.R.C.V.S., *Royal Veterinary College, Great College Street, Camden Town.*
1362 1899. Mar. DENNIS, Nelson F., ASSOC.M.INST.C.E., *Engineer and Surveyor, U.D.C., Aldershot.*
1364 1899. Mar. DHINGRA, M. L., M.D.EDIN., D.P.H.CAMB., C.M., *c/o Hutchinson & Co., Charing Cross, W.C.*

[illegible] 1899. Mar. DICKSON, John Rhodes, M.B., C.M.EDIN
Trinidad, W.I.

[illegible] 1899. Jan. DIXON, Edward Wilson, ASSOC.M.INST.
Albert Street, Harrogate.

[illegible] 1899. Jan. DIXON, Fredk. John, ASSOC.M.INST.C.E.,
Gate, Lincoln.

[illegible] 1899. Mar. EAGLES, Stanley Charles, Clarendon
Waterloo Street, Birmingham.

[illegible] 1899. Mar. ECCLES, Alfred Ephraim, Albion Villa, W
pice, Chorley.

[illegible] 1899. Mar. GLAISTER, John, M.D., D.P.H.CAMB., F.R.S.ED
The University, Glasgow.

[illegible] 1899. Jan. GREENHILL, Thomas Arthur, ASSOC.M.INS
mirante 5, Madrid, Spain.

[illegible] 1899. Feb. HOLMES, Harry, City Surveyor's Office, Bir

[illegible] 1899. Jan. HOWARTH, William James, M.D., D.P.H.
L.R.C.S., M.O H., Health Office, Ford Street

[illegible] 1899. Jan. KAYE, James Robert, M.B., C.M., D.P.H., F.
West Riding, Yorks., Wentworth Lodge,

[illegible] 1899. Jan. LOVEGROVE, Edwin James, ASSOC.M.INST.C.
Offices, Southwood Lane, Highgate, N.

[illegible] 1899. Mar. MARTIN, Arthur John, ASSOC.M.INST.C.E.,
House, Exeter.

[illegible] 1899. Mar. MARTIN, E. B., M.INST.C.E., Pedmore, n
bridge.

[illegible] 1899. Jan. MOORE, Col. Edward Crozier Sibbald, 65,
ham Road, Bedford.

1261 1899. Feb. *ORD, William, 17, Cambridge Gardens, H

1271 1899. Mar. SAVAGE, William G., M.D., D.P.H., Belf
Farquhar Road, Norwood.

1272 1899. Mar. TATTON, Reginald Arthur, M.INST.C.E., 4
Street, Manchester.

1273 1899. Mar. WALDO, F. J., M.A., M.D., D.P.H., M.O.H.,
at-Law, 1, Plowden Buildings, Temple,

1274 1899. Mar. YOUNG, Meredith, M.D., D.P.H., M.O.H.,
Crewe.

ASSOCIATES.

‡ Passed Examination for Sanitary Inspectors.

1845 1899. Jan. ‡AGAR, Thomas Wallace, 15, Derwent St
Hartlepool.

1849 1899. Mar. ‡ALLFLAT, Charles Drake, 27, North Ever
King's Lynn,

1846 1899. Jan. ‡BERRY, Fred, 8, Albert Terrace, Cra
Oldham.

847 1899. Jan. ‡BOLTON, Joseph Hook Percival, Chase S
gate, N.

1890 1899. Mar. ‡CAINE, William, 19, *Ainslie Street, Dalton-in-Furness.*
1849 1899. Jan. ‡CAMPBELL, John, 53, *Hugh Street, Wallsend-on Tyne.*
1891 1899. Mar. ‡CLARK, David Siddall, 1, *Piccadilly St., Haslingden.*
1893 1899. Mar. ‡DAVISON, John, 3, *Hotspur Place, Alnwick.*
1888 1899. Mar. ‡DAWSON, Samuel, 23, *Queen's Road, Chadderton, Oldham.*
1894 1899. Mar. ‡DE LA MOTTE, Freeman Alexander, *Foleshill, Coventry.*
1849 1899. Jan. ‡DONKIN, George Graham, 51, *Frederick Street, Sunderland.*
1862 1899. Feb. ‡DORMER, Percy Charles, *Hill Street, Raunds.*
1886 1899. Mar. ‡DOWN, William Edward, 54, *Kestrel Avenue, Herne Hill, S.E.*
1863 1899. Feb. ‡GARDINER, Miss Rosetta Elizabeth, 92, *Auckland Road, Upper Norwood, S.E.*
1860 1899. Jan. ‡GORTON, John Thomas, 35, *North Street, Murton Colliery.*
1870 1899. Feb. ‡GRAHAM, George William, 16, *Clyde Terrace, Spennymoor.*
1871 1899. Feb. ‡GRIFFITHS, Hugh Llewelyn, *Bush Street, Pembroke Dock.*
1851 1899. Jan. ‡HALL, Frederick William, *Success Fencehouses.*
1886 1899. Mar. ‡HANSON, Frederick, 2, *Atlas Street, Bradford.*
1864 1899. Feb. ‡HASSALL, Samuel, 31, *High Road, South Town, Great Yarmouth.*
1887 1899. Mar. ‡HEY, Benjamin, *Council Offices, Gargrave Road, Skipton.*
1899 1899. Mar. ‡HINDLE, William J., *East Morton, nr. Bingley.*
1872 1899. Feb. ‡HITCHCOCK, Frederick W., *Arundale, Seymour Villas, Anerley.*
1873 1899. Feb. ‡HOBDAY, Cecil Frank, *West Norwood Estate Offices, S.E.*
1899 1899. Mar. ‡HOLMES, Edward George, *High Street, Romford.*
1865 1899. Feb. ‡HOWIE, Miss Margaret Scott, *Joel View, Beech Road, Chorlton-cum-Hardy.*
1852 1899. Jan. ‡HOYTE, Miss Ethel Mary, *Euston Villa, Lansdowne Road, Worcester.*
1865 1899. Feb. ‡HUSSEY, Edwin Stanley, 10, *Shroton Street, Marylebone Road, W.*
1862 1899. Feb. ‡JACKSON, Frederick, 24, *Cambridge Street, Werneth, Oldham.*
1858 1899. Jan. ‡JONES, Rhys William, *Morfa Uchap, Abercrave, Ystradgunlais R.S.O.*
1900 1899. Mar. ‡KING, James William, 14, *Oakley Crescent, Chelsea, S.W.*
1901 1899. Mar. ‡LAWTON, Charles Henry, 27, *Cromford Road, Wirksworth.*
1902 1899. Mar. ‡LEAF, Edwin, 24, *Brecknock Road, N.*
1874 1899. Feb. ‡LEVESLEY, George William, *Town Hall, Dewsbury.*

1903 1899. Mar. ‡Littleton, Frank, 139, *Latchmere Road, Shaftesbury Park, S.W.*
1854 1899. Jan. ‡Loveday, William Frederick, *The Council Offices, Milton Road, South Hornsey, N.*
1870 1899. Feb. ‡McMeikan, Thomas, 3, *Carwinion Terrace, Liskeard.*
1904 1899. Mar. ‡McNair, Alexander, 85, *Vauxhall Bridge Road, S.W.*
1873 1899. Feb. ‡Miller, George Longbotham, 5, *Belle Vue Terrace, Whitby.*
1877 1899. Feb. ‡Miners, George John R., 39, *Dee Street, Bromley, E.*
1855 1899. Jan. ‡Morgan, William, *Park View, Llantrisant.*
1856 1899. Jan. ‡Newell, , *Shipka Road, Balham, S.W.*
1905 1899. Mar. ‡Northcote, n Thomas Hawken, *Fowey, Cornwall.*
1906 1899. Mar. ‡Pegram, George enry, *West View, Epping.*
1876 1899. Feb. ‡Plews, Willia , 49, *King Street, North Shields.*
1886 1899. Feb. ‡Potter, James *Ensley Street, Bingley.*
1907 1899. Mar. Prescott, *Town Hall, Manchester.*
1879 1899. Feb. ‡Roberts, n Henry, 31, *Rochester Avenue, Upton Park, E.*
1908 1899. Mar. ‡Robinson, Tom, 12, *Primrose Street, Nelson.*
1909 1899. Mar. ‡Salkield, Thomas, *Hoddesden, Herts.*
1910 1899. Mar. ‡Sharples, Miss Margaret L., *Springfield, Little Sutton.*
1881 1899. Feb. ‡Slaughter, Frederick, *Jarvis Villa, Steyning.*
1867 1899. Feb. ‡Souter, William, 296, *Oldham Road, Failsworth.*
1880 1899. Feb. ‡Southwart, Joseph, 4. *Richmond Terrace, Matlock Bridge.*
1911 1899. Mar. Stansfield, William, *Town Hall, Manchester.*
1866 1899. Feb. ‡Stocks, George, *Church Fields, Brighouse.*
1912 1899. Mar. ‡Taylor, James B., 41, *De Grey Street, Hull.*
1913 1899. Mar. ‡Trueman, James, *Bollington.*
1869 1899. Feb. ‡Wagstaffe, William Joseph, *Holmes Chapel, Crewe, Cheshire.*
1857 1899. Jan. ‡Walker, William Lea, 1, *Idris Villa, Towyn.*
1883 1899. Feb. ‡Walker, Frederick Lambert, 8, *Gladstone Road, Watford.*
1887 1899. Feb. ‡Watson, Arthur, 109, *Trafalgar Street, Sheffield.*
1858 1899. Jan. ‡White, Thomas, 77, *Ward Street, Sunderland.*
1884 1899. Feb. ‡Wilkinson, Hargreaves, 18, *Hamilton Street, Bury.*
1868 1899. Feb. ‡Wilkinson, Percy George, *Rossiter Rd., Greasboro', Rotherham.*
1859 1899. Jan. ‡Wilson, Fred, 225, *Nottingham Street, Sheffield.*
1888 1899. Feb. ‡Winter, Edward, Junr., 82, *Church Road, Hove.*
1914 1899. Mar. ‡Wiseman, Fredk., *c/o T. Stewart, c/o W. Watson & Co., Pall Mall, S.W.*
1860 1899. Jan. ‡Wright, William George, 4, *Rutland Street, Weneth, Oldham.*
1861 1899. Jan. ‡Wynne, Miss Annie, 16, *Albert Street, Nelson.*

OBITUARY.

HIS GRACE THE DUKE OF NORTHUMBERLAND, K.G.

(FELLOW).

We deeply regret to announce the death of the Duke of Northumberland, which occurred at Alnwick Castle, on the 2nd January, 1899, in his eighty-ninth year.

The Duke with his wide influence—an influence which was ever exerted for the benefit of all who came within his sphere—had shown a special interest in the Royal Institution of which he was President; in the Royal National Lifeboat Institution of which he was also President; in many other Societies, and also in the Sanitary Institute of which he was the first President.

The Duke of Northumberland presided at the first meeting in 1876, which was held for the formation of this Institute, and frequently after that date he presided at meetings and contributed liberally to the support of the work of the Institute. It was the deep interest which he showed in those early days of its growth—before a desire for sanitary knowledge had been awakened in the general public—which so materially assisted in creating and developing the spirit of sanitary reform.

He remained President of The Sanitary Institute from 1876 until 1891.

The Duke endeavoured by every means to carry out the laws of health in the widest sense, and to promote the social improvement and comfort of the people living on his vast estates.

No one recognized more fully than the Duke while supporting the Sanitary Institute, that the moral as well as the physical advantages of his fellow creatures were being thus developed, and he never lost an opportunity of bringing this conviction into practical effect.

The energy of the Duke during his long life has been most remarkable, and the proofs of his philanthropic exertions remain stamped on his various homes, whether we think of him as Patron of a large property in Surrey, or of his Dukedom, almost principality, in Northumberland. The sustained splendour of his stately life made him for more than half a century one of the greatest personages in England. His whole career may be said to have set a noble example of unostentatious stewardship in reference to all his gifts—gifts physical, intellectual, and

mind—gifts of wealth and influence, which he used i
for the good of his fellow men.

While deeply regretting the death of one who has
himself so beloved and honoured, we cannot conclu
notice without expressing our thankfulness that the
interest in matters of Hygiene has so largely been inher
his son, the present Duke, who as Lord Percy, presided
Sanitary Institute Congress at Newcastle, in 1896, a
has continued to show a keen interest in its welfare.

M. D

SIR DOU[illegible] GALTON, K.C.B., F.R.S., &c.

([illegible] AND TREASURER).

Our Institute has sustained an irreparable loss in th
of Sir Douglas Ga[illegible], who has, for many years,
himself with unwe[illegible] energy to its interests.

Sir Douglas [illegible] was the son of Mr. John
Galton, of Hadzor [illegible], Worcestershire, and was
1822. He was edu[illegible] partly at Birmingham, pa
Geneva, in the home [illegible] a Swiss pastor, and then at
under Dr. Arnold, wi[illegible] Lord Cross, Theodore Walro
Tom Hughes among his school-fellows. From Rugby
sent to the Royal Military Academy at Woolwich, wh
highly distinguished himself and obtained his commis
the Royal Engineers after "breaking the record" by ob
a first prize in every subject of the examination.

In 1842 he was employed in the removal of the
George, and in 1843 in the fortifications of Malta and Gi
From 1846 to 1856 he devoted himself to Railway Engi
and in the last named year was made Secretary to the
Department of the Board of Trade, and in the same
reported on the Metropolitan drainage scheme as a Gove
referee.

He was strongly opposed to the discharge of the
sewage into the Thames near Barking and Crossness, b
opinion that the river would be seriously fouled there
that the sewage ought to be taken further away to Sea
where it would be mixed with a much larger volume of
and subsequent events have shown that his anticipatio
fully justified.

He also devoted much attention to the construction
marine cables, and in 1859, after the Atlantic cable
had broken down, and the Red Sea and Indian telegr
proved a failure, he acted as Chairman of a Commit

pointed by the Government to investigate the whole question. This Committee, after collecting evidence and information from every available source, published a Report in 1861, which has been well described as the "most valuable collection of facts, warnings, and evidence, ever compiled concerning submarine cables."

In 1860 he was appointed Assistant Inspector General of Fortifications, and in 1862 Lord Palmerston made him Assistant Under-Secretary of State for War, a position which he held for eight years.

His services were recognised by his being made a C.B., in 1865. From 1870 to 1875 he acted as Director of Public Works and Buildings, in the Office of Her Majesty's Board of Works.

He had, however, not lost his interest in matters connected with Railways, for in 1866 he was one of those (among whom was the Duke of Devonshire), who signed a report on the possibility of the reduction of railway charges, the provision of workmen's trains, and the purchase of railways by the State.

In 1876 he acted as a Judge on railway appliances at Philadelphia, and in 1878 at Paris. During 1878 and 1879 he brought before the Institution of Mechanical Engineers the results of his experiments on the effects of railway brakes in a series of papers, which have ever since ranked amongst the standard works of reference for Railway Engineers.

From 1875 to 1895 he acted as one of the General Secretaries of the British Association, a post for which he was especially well fitted on account of his intimate connection with so many practical branches of science, and only resigned the Secretaryship in 1895 on being elected President.

But he was most keenly interested in sanitary matters. Reference has already been made to his views on the Metropolitan main drainage scheme. After the Crimean war he was appointed a Member of the Commission which visited the Barracks and Military Hospitals not only in Great Britain and Ireland, but on the Mediterranean Stations, and many improvements in Barracks and Hospitals are due to his initiative, while the health of the Army has no doubt been much improved by the carrying out of sanitary measures recommended by that commission. The Herbert Hospital at Woolwich was constructed according to his designs. He also gave a course of lectures on Army Sanitation at the School of Military Engineering, Chatham.

As Captain Galton he invented the grate which still goes by his name, and which introduced a new idea in connection with warming appliances. He, however, never patented his

invention, and so it was to no one's interest to further otherwise there can be very little doubt that it would ha been much more generally adopted than it has been, wi great advantage to himself and to the public at large.

He was among the first and most earnest supporters of t Parkes Museum, and was Chairman of its Council from 18 to 1888. He was also one of the early supporters of t Sanitary Institute of Great Britain, and acted as Chairman its Council from 1885 to 1887. Since the amalgamation these two bodies to form the present Sanitary Institute has been twice Chairman of Council, viz., 1888 to 1892 a 1897 to 1899. He [illegible] l Vice-President in 1892 a accepted the office [illegible] r in 1894, positions which held until his death. [illegible] r many years Chairman of Board of Examiners an[illegible] great interest in this bra of the Institute's w[illegible] s in the training of Sanit Officers, to whom [illegible] tured both in London and the Provinces, and [illegible] lectures will be found in current number of [illegible]

In 1891 he acted a[illegible] of the Executive Commit of the Internatio[illegible] of Hygiene and Demogra held in London in [illegible] and to his efforts the success the Congress was large[illegible]

Besides his course of lectures on Army Sanitation he wr important works on "Healthy Dwellings" and "Heal Hospitals."

In 1859 he was elected a Fellow of the Royal Society, a more than once served on its Council, and he was als member of many other learned Societies in this country a abroad.

In 1887 he was made a K.C.B., and in 1889 an officer the Legion of Honour and Knight of Grace of the Order St. John of Jerusalem. He also received the Orders of Crown of Prussia and of the Medjidieh. In 1894 the stitution of Civil Engineers made him an honorary mem The University of Oxford awarded him the degree of D.C those of Durham and of Montreal that of LL.D. He w J.P. and County Councillor for Worcestershire.

He died on March 10th, 1899, at his town reside 12, Chester Street, after a serious attack of blood-poiso commencing on February 13th. He leaves his wife (daug of Mr. G. T. Nicholson, of Waverley Abbey, Surrey,) and daughters to mourn his loss. Although he was a promin advocate of cremation, he was buried at Hadzor for fa reasons.

The foregoing description gives a very slight idea of

amount of work done by Sir Douglas Galton. Only those who worked with him, as Members of the Council of this Institute have done for years past, can have any idea, either of the amount of work he got through, or of the thoroughness with which he entered into everything which he undertook.

His consideration for the views of others, even in matters of which he was an acknowledged authority, was remarkable, although he never hesitated when necessary to express and support his own views in a decided manner.

Of kindly disposition and courteous manner he made many friends, and few, if any, enemies; and all who knew him, and who lament his loss, will recognise the appropriateness of the epithet applied to him by one of the Foreign Delegates of the International Congress of Hygiene and Demography, "his amiable personality."

W. H. C.

MEMORIAL SERVICE AT SAINT PETER'S, EATON SQUARE.

CONDUCTED BY THE REV. JOHN STORRS, VICAR.

A Memorial Service for Sir Douglas Galton was held at his parish church, St. Peter's, Eaton Square, on Thursday, the 16th of March. It was conducted by the Vicar, and an address was made by the Dean of Gloucester. The Burial Service was used, except those parts which are said when bodies are lowered into the ground. The service was rendered beautifully by the Choir; the 90th Psalm being most impressive. After the Lesson, the hymn "Lead, Kindly Light," was sung; most appropriately for one who was above all things a seeker after God. The Dean developed this thought in his Address, showing how Sir Douglas, in all his work, had two ends before him; to widen our notions of God through scientific knowledge and discovery; so to apply science as to make human lives healthier and happier. The result of such a life has been to increase our higher knowledge, and to diminish human suffering. Few men had so many different lines or spheres of work as Sir Douglas Galton. Still fewer have been acknowledged as authorities in so many and various directions. His work was recognised by those whose acknowledgment is

best worth having; by specialists, who can judge; b
who benefited practically through it. These formed
congregation of mourners. The numerous Societies, i
Sir Douglas had been a leading member, were repr
and there were present many humble friends and
workers. To these must be added troops of friend
during an official life of nearly half a century, and attr
a singular charm of manner. Only those who know c
of his unfailing and innumerable acts of help and kindn

At the conclusion of the Service, the hymn, "Ne
God to Thee" was sung; and Chopin's Funeral Ma
played.

ADDRESS.

By The Very Rev. DONALD SPENCE, Dean of Glo

I remember reading once how a great Preacher a
for speaking Sunday after Sunday of death and eter
making it the perpetual burden of his discourse. "He c
help its monotony." He said he would "cease the stra
men were holy enough to hail the death that opens the
to eternity, but not till then. Still, monotonous tho
theme be, when a well-known, well-loved name has
from the earth, when that which once lived and breat
impersonation of restless energy and noble striving h
borne away to be entombed in the sepulchre of hist
heart of the most careless is arrested, the mission c
seems to come direct from Heaven, and that decease,
only the fulfilment of Nature's convenient law, startl
something strange, it seems to be the immediate interfe
God!"

We are met to-day (Brothers) to pay a last tribute
and respect to one who for many, many years has bee
minent figure in the public life of our England.
scarcely believe he has been taken from us. But *yeste*
bright, sunny presence was with us—inspiring his fel
to noble and generous work for their neighbours; yet w

dare not grieve *overmuch* that our Brother has passed into the open vision of God, for a long life of strength and generally successful effort lay behind him when the summons came.

In reviewing the last fifty years, perhaps the brightest pages of our "island story" are filled with the record of the successful efforts of earnest men to make life for their fellow-men brighter, more healthy, less marred with disease and sickness.

It is a quiet work it is true, and makes less noise in the world than the deeds of the successful soldier or sailor,—than the book of the romancist, or the poem of the song man. It is a quiet work less known and honoured than the acts of the successful politician and statesman. But though such a work be less acknowledged, less loudly applauded, it is perhaps more blessed, certainly more enduring; and one of the chief places in this little band of God's true heroes who have helped unnumbered men and women to lead brighter, healthier lives was filled by Douglas Galton, whose loss we sorrow for with an unfeigned sorrow to-day. This is, and can be, no panegyric of our dead friend; no one would venture upon this in these sacred walls; but it is a glad thought for us who mourn him to call to mind his ceaseless, generous, self-forgetting work, remembering how the soldier has good cause to bless his memory; how the poor in our great cities lead lives happier, healthier, thanks to his unwearied toil and forethought.

No one perhaps in this sad company gathered here to-day, has better cause than he who now with stammering tongue and tear-filled voice addresses you, to speak in reverent, loving terms of that great soul now with his Master, whom he served so long, so faithfully, so unweariedly.

It is nearly forty years ago when on the threshold of life I was thrown with him and enjoyed the rare fortune of a great teacher's inspiring example. He taught me much, the beauty of a work-filled life, a life lived to help others, to do good to others, 'laborare est orare' was the motto he pressed home to me by his example, nor was it alone in earnest, restless work he taught me the best way to make life beautiful and happy.

True friend—chivalrous helper of the weak and suffering, of all who needed help—unwearied, restless seeker after the higher knowledge which benefits others, true toiler for God—we must not mourn him as those who have no hope, for our friend is with his Master, with our God and His Christ for ever. Yes, it is well with him.

The enemies of Religion, of purity and of all things lovely and of good report, are too ready to cast a stone at what they hate and dread, by recklessly asserting that the friends of Holy Religion and of [illegible] rely to be found among *les âmes d'élite* among us. [illegible] ry is the case. The noblest and most loyal servant [illegible] and His Christ are found among our Statesmen, [illegible] Lawyers, in the ranks of our bravest, our most di [illegible] sailors, soldiers, among our leading men of science— [illegible] friend who has just fallen asleep was a conspicuous [illegible] here. There were two sides to that white soul. In pu [illegible] was ever the restless, tireless seeker after the secrets of [illegible] ience, which daily finds out new methods of making [illegible] hter and more tolerable to the dwellers in great Cities. In private, he was the holy and humble man of God, who knows too well our littleness and weakness, who seeks and finds the source of strength and confidence in the everlasting arms outstretched beneath him.

SIR WILLIAM JENNER, Bart., G.C.B., M.D., F.R.S.

In Sir William Jenner, who died in December last, the medical profession sustained a very great loss, for Sir William was for many years the greatest authority on Medicine in this country, and its leading practitioner. In Preventive Medicine Jenner's name will always take a very high place, as it is very largely due to his exact and painstaking researches that a distinction was effected between Typhus fever and Typhoid or Enteric fever, diseases which prior to 1849 had been very commonly confused. It is safe to say, at the present time, that without the light which Jenner so successfully threw on the causation and pathology of Enteric fever, the immense advances made during the past fifty years in the eradication of this disease, would have been impossible, and one of the greatest triumphs of the science of Hygiene would be wanting.

Sir William Jenner was the life-long friend of the late Professor Edmund Parkes, the two men having been fellow-students at University College. Sir William interested himself greatly in the proposal to found a permanent memorial worthy of Dr. Parkes' life and character, and was one of the founders of the Parkes Museum, which resulted from the efforts then made to perpetuate the good work with which Dr. Parkes' life was identified. Sir William was himself a very firm believer in the connection between dirt and disease, and on one occasion said, as the result of his very great experience, he was convinced that palaces were often as insanitary as workmen's cottages, and that the very rich as well as the poor were equally in need of the lessons that Hygiene has to teach. There can be no doubt that his opinions were to a considerable extent instrumental in arousing interest in sanitary work amongst the highest in the land, and that the good fruits there brought forth have subsequently extended themselves through all classes of society.

L. C. P.

SURGEON-GENERAL SIR JAMES MOUAT, V.C., K.C.B., Q.H.S., F.R.C.S.

(MEMBER.)

Was the son of the late Dr. James Mouat, an Army Surgeon; born in 1815, educated at University College, London, and in Paris. He joined the Army Medical Department 14th Dec., 1838, was gazetted Surgeon-General 26th Jan., 1868, and died 4th Jan., 1899, at his residence in Kensington.

He served in the Crimea with the 6th Inniskilling Dragoons. He was gazetted V.C. for the following gallant service: "for having voluntarily proceeded to the assistance of Lieut.-Colonel Morris, 17th Lancers, who was lying dangerously wounded in an exposed position after the retreat of the Light Cavalry at the Battle of Balaclava on October 26th, 1854, and having dressed that officer's wounds in the presence of the enemy; thus by stopping a serious hemorrhage he saved that officer's life." He received his C.B. 4th Feb., 1856, and was made a Knight of the Legion of Honour, 5th Class, for his services on the Medical Staff. He was given charge of the general Field Hospital of the 3rd Division during the siege of Sebastopol until its fall, and was principal Medical Officer at Balaclava to the close of the campaign.

He was subsequently in New Zealand in the war of 1860- under General Pratt; he was twice mentioned in despatc "for valuable services rendered at all times and in all positio Afterwards, under Sir Duncan Cameron, he served as princ Medical Officer in the Waikatoo, Taranaki, and Taura districts in 1863-65; was again repeatedly mentioned in spatches, thanked by the Colonial Government, and rec mended for some mark of Her Majesty's favour.

Sir James Mouat retired 5th July, 1881, he was n Honorary Surgeon to the Queen in 1888, and became K. in 1894.

He joined the Parkes sc n as a Member in March, 1 and The Sanitary Institute a Member *at the date of its i poration* in 1888, and took onsiderable interest in its ceedings and in the progress of Sanitary Science.

L.

J. WALLACE PEGGS, Assoc. M.Inst., C.E.

(Fellow.)

James Wallace Peggs, Assoc. M.Inst., C.E., was bor London, and educated at King's College School, London. 1865 he was articled to Mr. J. W. Grover, M.Inst., C.E. acted as Resident Engineer of the Cleveland Pier an the pier at the Royal Arsenal at Woolwich. In 187 designed and superintended a dock and sea wall at Gar near Liverpool, and he was engaged by the Metropolitan Asy Board in erecting an ambulance station and pier at Fu and on other works.

Mr. Peggs was elected a member of Council of the San Institute in 1888, and continued a member until a months since, when he resigned in consequence of failing he He took a very active part and was of very great assis in the classification and arrangement of the exhibit he took a very great interest in the Parkes Museum, he designed and presented the very interesting model, sho the cone of depression produced in water bearing strata c by pumping from a deep well.

He acted for several years as one of the judges in conne with the annual exhibitions, in which capacity he ren very valuable service, and his death will be felt as a seriou to the Institute.

H.

EXHIBITS ADDED TO THE MUSEUM,

JANUARY TO MARCH, 1899.

Case of Materials used in Upholstering, including Shoddy, Horse-hair, Cotton-waste, Wool-waste. *Purchased.*

Cinder Sifter and Ash-bin combined. *Arkinstall Bros.*

Clencher Pedestal Water-closet. *J. Duckett & Son.*

Gas Heating and Ventilating Stove. *Davis Gas Stove Co.*

Boiler Burner, with an automatic arrangement for diminishing the consumption of gas when the cooking utensils are removed. *Davis Gas Stove Co.*

Specimen of Helliwell's Patent Puttyless Glazing for glass roofing. *Farrer, Barber & Co.*

Water Boiler (Instantaneous) fitted in action. *H. Jackson.*

Photograph of Water Cart. *Glover & Sons*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

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*** *For publications of Societies and Institutions, &c., see under "Academies."*

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Aston Manor, 1898	*F. H. May, M.R.C.S., D.P.H.*
„ „ „ (San. Insp.)	*B. Bolt.*
Chelsea, 1897	*Prof. W. H. Corfield, M.A., M.D.*
Clayton-le-Moors, 1898 ..	*Dr. Tattersall.*
Harrow-on-the Hill, 1898 ..	*J. Fletcher Little, M.B.*
Huddersfield, 4th quarter, 1898	*E. G. Annis, M.R.C.S., D.P.H.*
Kidderminster, 1898 ..	*D. Corbet, M.O.H.*
Lancashire C.C., 1892 ..	*Prof. W. H. Corfield, M.A., M.D*
Plumstead, 1897	*Prof. W. H. Corfield, M.A., M.D*
Rotherhithe, 1897	*Prof. W. H. Corfield, M.A., M.D*
St. George, Hanover Sq., 1897	*Prof. W. H. Corfield, M.A., M.D*
St. Giles, 1897	*Prof. W. H. Corfield, M.A., M.D*
St. James, Westminster, 1897	*Prof. W. H. Corfield, M.A., M.D*
St. Mary, Islington, Second Quarter, 1898	*Prof. W. H. Corfield, M.A., M.D*
Warwickshire C.C., 1897 ..	*Prof. A. Bostock Hill, M.D., D.P.*
West Riding C.C., 1897 ..	*J. R. Kaye, M.B.*
St. Thomas R.D.C., 1898 ..	*Mark Farrant, M.R.C.S.*

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NOTES ON LEGISLATION AND LAW CASES.

RIVER POLLUTION.—"*Putrid Solid Matter*"—*Rivers Pollution Prevention Act, 1876 (39 & 40 Vict. c. 75), ss. 2, 17, 20.*

Sect. 2 of the Rivers Pollution Prevention Act, 1876, prohibits the putting, or causing or knowingly permitting to be put, "any putrid solid matter" into any stream so as to pollute its waters, and by s. 20 "'solid matter' shall not include particles of matter in suspension in water." By s. 17 the Act "shall not apply to or affect the lawful exercise of any right of impounding or diverting water."

The Defendant owned weaving sheds, worked by steam power, on the banks of a stream, and he had for many years prior to the passing of the Act lawfully exercised the right of impounding and diverting water from the stream for the purposes of his business. Such water was diverted from the stream through a goit and impounded in the defendant's reservoir, and contained substances discharged into the stream from paper manufactories not belonging to the defendant, higher up the river. Whilst the water was so impounded those substances sank to the bottom and became putrescent in the form of sludge. Part of the water, when thus cleared, was taken from the reservoir and used for condensing purposes. Once a week the reservoir was cleaned by opening sluice-gates into the river and allowing the water to flow through the reservoir and out into the stream, carrying with it the sludge deposited in the reservoir. The effluent water as it went into the stream through the sluice-gates contained 97·6 per cent. of water and 2·4 per cent. of solid matter.

Held, that the solid matter, when it entered the stream from the reservoir, was "solid matter in suspension in water" within s. 20, and therefore not "solid matter" within the meaning of s. 2 of the Act:

Held also that, assuming that what was put into the stream was "solid matter" within the meaning of s. 2, the defendant was protected by s. 17, and therefore not liable to be proceeded against under the Act.

RIVER RIBBLE JOINT COMMITTEE *v.* HALLIWELL.

THE SAME *v.* SHORROCK.

For full text of this see page 27 Law Reports, which can be referred to in the Library of the Institute.

LOCAL GOVERNMENT.—*Water—Supply of Water to Local Authority—Public Health Act, 1875, (38 & 39 Vict. 62—Public Health (Water) Act. 1878, (41 & 42 Vict. c.*

By the Public Health Act, 1875, s. 62, a local author under certain conditions, require the owner of a house witl district to obtain a supply of water to his house, and in defa compliance may themselves do the necessary work and rec expenses from him. By the Public Health (Water) Act, 18 a rural sanitary authority may, where a house within thei has not within a reasonable distance from it a supply of wa they think that such supply can be brought within a reasor tance at a cost not exceeding certain specified limits of require the owner to provide such supply within a reasonable of his house, and in default of his compliance may th execute the necessary works, and recover the cost from him

Held, that s. 3 of the later Act did not apply to limit the of the expenses which the local authority might recover ag owner in proceedings under s. 62 of the earlier Act.—(W CASHIRE RURAL DISTRICT COUNCIL *v.* OGILVY.)

For full text of this see page 377 Law Reports, whicl referred to in the Library of the Institute.

These notes are copied by permission from the Law published by the Incorporated Council of Law Reporting for and Wales.

RIGHT OF ENTRY.—*Entry refused—Magistrate's O*

Sections 10 and 40 of the Public Health (London) Act, 18 the Sanitary authority a right to enter premises for the pu out in those sections. In the event of entry being refused, trate's order may be obtained under section 115 if the satisfied that there is reasonable ground for such entry.

The Sanitary Inspector of St. Pancras applied at a sch admitted and was refused; she then applied to the police m for an order to enter, but in her information did not state had reason to believe that there was anything wrong in the arrangements at the school. The magistrate refused the ap holding that no reasonable ground had been shown for ente

The Vestry appealed, and judgment was given for the res in accord with the magistrate's decision.

Held, that the right of entry did in fact exist under se and 40. That it was only where such right existed and e been refused that application could be made for a magistrat That when a magistrate's order was applied for, reasonable for the entry must be shown. That the statement that the wished to enter for the purpose of examining as to the exi any nuisance therein, is not a reasonable ground.—(VIN NORTH LONDON COLLEGIATE SCHOOL, before Mr. Justice] and Mr. Justice Channell.)

KENNY & CO., Printers, 25, Camden Road, London, N.W.

Volume XX.—Part II.] [July, 1899.

JOURNAL
OF
THE SANITARY INSTITUTE.

LONDON (WELSH) WATER SUPPLY.

By R. E. MIDDLETON, M.Inst.C.E., M.Inst.M.E.
(Fellow.)

Read at Sessional Meeting held on February 8th, 1899.

As is well known, the London County Council in the year 1891 urged upon the then Government the appointment of a Royal Commission, whose duty it should be to consider whether "taking into consideration the growth of the population of the Metropolis and the districts within the limits of the Metropolitan Water Companies, and also the needs of the localities not supplied by any Metropolitan Company, but within the watersheds of the Thames and the Lee, the present sources of supply of these companies are adequate in quantity and quality; and if inadequate, whether such supply as may be required can be obtained within the watersheds referred to, having due regard to the claims of the districts outside the Metropolis but within those watersheds, or will have to be obtained outside the watersheds of the Thames and Lee."

In the early part of 1892 a Royal Commission of seven members, comprising some of our most eminent engineers and scientists, under the presidency of Lord Balfour of Burleigh, was appointed, and after hearing evidence of the most voluminous description, in which the London County Council was very fully represented, they decided that the present sources of supply are of unexceptional quality and ample in quantity.

Notwithstanding the finding of the Royal Commission appointed at their request, notwithstanding the fact that in 1896 Parliament granted to the Staines Reservoirs Joint Committee power to deliver an additional quantity of 35 million gallons of water a day, and in the year 1898 to the Southwark and Vauxhall Company power to draw 20½ million gallons a day in

excess of their authorised take from the Thames, notwithstanding that their witnesses have declared their intention of maintaining a supply of 185½ million gallons a day from the Thames, and that therefore, on their own showing, there can be no objection to the quality of the water, the County Council have deposited Bills for the construction of reservoirs in Wales, and aqueducts to bring water from Wales to Elstree, and thence to the London consumer, utterly regardless of the finding of Lord Balfour's Commission, of cost, and of the consumers and ratepayers' interests.

The proposal of the London County Council is to construct reservoirs on the Yrfon River, a tributary of the Wye; on the Towy, which flows into Carmarthen Bay; on the Upper Wye and on the Chwefri, a tributary of the Yrfon; with a compensation reservoir on the Doethie, a tributary of the Towy.

Connections are intended to be made between the several reservoirs and an aqueduct to carry some 210 million gallons of water a day; to pass through or near Builth, Hay, Dorstone, Abbeydore, Much Dewchurch, Harewood, Ross, Longhope, Wooton, Great Barrington, Charlbury, Heath, Padbury, Cheddington, Hemel Hempstead, and Abbots Langley, to deliver the water into a service reservoir proposed to be constructed at Elstree in Hertfordshire, from which place the water would be forwarded through a conduit to filter beds at Edgware, which would again have to be connected with the service reservoirs of the Companies.

The drainage area contributing to this supply is said to be about 200 square miles, more or less, while if the whole available drainage area be taken into account, it is 488 square miles.

If the rainfall available for supply and compensation be taken at 28½ inches over the whole area, that for supply alone will be 21·4 inches or 415 million gallons a day, the supply which the promoters say the district is able to afford. I do not hold myself in any way responsible for these figures.

The drainage area of the Thames down to the intakes of the Companies is 3,548 square miles, the available rainfall may be taken at 7·6″, or, for supply alone, 5·7″, which is equal to a daily supply of 800 million gallons.

This is the quantity which is available from the Thames under the same conditions which the London County Council propose to apply to the Rivers Wye and Usk, and of which they say they will only utilize 185½ million gallons.

The question of what supply is obtainable from the Thames within the limit of 800 million gallons a day, is as in the case of the proposed Welsh reservoirs, one of storage, and of storage only. Neither the Yrfon nor the Wye will yield anything like

the quantity of water required from them day by day without storage, but the Thames will yield a far larger daily supply without storage than the Wye and the Yrfon, and equally will it yield a far larger supply with storage than will those rivers.

The very lowest natural flow of the Thames has been 175 million gallons for one day, or in proportion to the maximum quantity obtainable from it for purposes of supply as 175 to 800, or 1 to 4½ nearly. The minimum flow of the Wye was 1,872,000 gallons in one day or as 1·872 to 43,000, or as 1 to 24 nearly.

It is not intended to suggest that because there is this disproportion between the minimum flow of the two rivers the latter will not afford the supply indicated, although such may be the case, but it is certain that the river with the more constant flow is more reliable than that which depends to a large extent on sudden floods for filling its reservoir.

It was estimated by Lord Balfour's Commission that the population of Greater and Water London will be, in the year 1931, some 11¼ million persons and that the daily supply of water necessary for this population will be 393,750,000 gallons. The London County Council put the figure somewhat higher.

To meet these requirements, Lord Balfour's Commission stated that

The Thames would provide at least	300 million gallons.
The Lee	52½ " "
Wells in the Lee Valley	40 " "
Wells in the Kent Co.'s district ...	27½ " "
	420

or sufficient to supply a population of 12 million persons at 35 gallons per head.

They also stated that from wells in Kent, outside the Kent Co.'s district, a further supply of 123 million gallons a day might be obtained, making a total of 523 million gallons a day.

If for the 300 million gallons a day estimated to be drawn from the Thames up to the year 1931, the total available supply of 800 million gallons be substituted, the total from all sources, other than from wells in the Thames Valley, from which a still further supply is obtainable, becomes 1,023 million gallons a day, sufficient for a population of more than 29,000,000 persons, and 312½ million gallons in excess of the authorised supply from the Thames and Lee and from Wells, which the London County Council say they would, should they become the water authority for the Metropolis, continue to utilise, along with 415 million gallons a day to be obtained from Wales.

If so large a supply is available near home, it may well be

asked why go to Wales, especially as on the shewing of t County Council the cost of bringing water from Wales will greatly in excess of the cost of drawing a similar quantity water from the Thames, storing so much of it as is required f use in summer, when the flow of the river is comparative small, and pumping the whole quantity to the supply of t several districts.

When judged by analogy from the known cost of the larg supplies which have, up to the present time, been afforded England, the estimate of the London County Council is fou to be altogether inadequate.

Judged by this criterion, the cost of these works to deli 215 million gallons a day is found to be, in round numbe £32,755,000, and the interest payable on this sum up to t year 1948, without consideration of any provision for a sinki fund, would amount to £24,393,000.

If the present sources of supply be utilised to the sa extent, the cost of the apparatus to do the same work wo amount, for capital and pumping charges, to £13,360,000, a for interest on capital £4,920,000.

Up to the year 1948 the Welsh scheme would have c £57,143,000, as against £18,280,000 spent on a supply dra from the Thames.

There is another aspect in which these figures may be loo at, which would no doubt, should the Welsh reservoirs be c structed, be very consoling to those yet unborn if they co know anything about it, namely, the obligation of a pu authority to provide a sinking fund for the eventual extincti of the capital charges, and therefore of the interest; but t only immediate effect of this provision is to increase the p ments which must be made by the consumers and ratepaye which in the year 1948 would amount to something l £1,200,000 per annum; and as, should London continue increase, so must the works necessary to supply it with wa be supplemented, the date at which it would be free from d on this account cannot be estimated, and the outlook for t generation, that with which we are more particularly interest could not be a cheerful one.

If London were in the position of Manchester, Liverpool, Birmingham, with supplies exhausted and without the po bility of augmenting them, except by going to some dist watershed, we could but make up our minds to go to Wales elsewhere to obtain a further supply, but when it is shown t our magnificent river can afford a more than sufficient sup of water of the best quality, and at far less expense, the rea for going to Wales disappears.

It has been suggested that there is a popular demand for other water. I have lived in London for a good many years, and I confess that I have not heard of it, and I believe it to be entirely fictitious; moreover, the health of the Metropolis is a sufficient answer.

If there are any who complain of the water supplied by the London Companies, and who say that it should be always as clear and bright as spring water, I will ask them if they know what a Welsh stream in flood is like, when the water is the colour of porter. The water from mountains and in streams passing through or over peat contains far more vegetable matter than does Thames water.

It has further been suggested that the London Companies are defaulters. Even if they were, which is untrue, for with the exception of the East London, no Company has failed to afford a full supply even during the extreme drought of last year, and the same cannot be said for all Corporations, the East London Company, at the worst, afforded a larger supply per head than many provincial towns. Even if they were defaulters, does the blame rest with them? They have been persistently obstructed whenever they went to Parliament for power to increase their works in order to fulfil their obligations. The attitude of the London County Council, their indifference to the requirements of the public, and their animosity to the Companies, cannot be better expressed than in the words of their own Counsel when he said "If the East London were bought it would be bought as a defaulting Company, it not being able to supply the water. If this scheme (Intercommunication between Companies) were carried out, it would be bought as a Company that had the water, and could supply, and I think it would get a much larger number of years' purchase then."

It matters not to the London County Council whether the East Enders have or have not water if only they can buy the Company cheap. It may perhaps be as well to remind my hearers that a Company is not necessarily in default if, owing to unusual drought (and a similar drought to that of 1898 had not occurred for more than 80 years) it is unable to supply.

The London County Council complain of the East London Company that their reservoirs are not large enough. It is but five years since Mr. Stuart, on behalf of the London County Council, said that they were too large, and only the other day their Engineer expressed his conviction that they were sufficient.

In considering the advantages to be obtained by the purchase of the Company's undertaking, and the disadvantages, which may accrue, it it well to bear in mind that the Companies are

the Companies, it is the shareholders who suffer, but w
works in the hands of an authority it is the water co
who has to pay the piper.

Had the supply of London been in the hands of a
authority when the great frost of 1895 occurred, the
consumers would not only have been without water, in
cases for weeks together, as happened in many provincial
but like the inhabitants of those towns, they would have
pay for being without water, and for all the damage do
cost of which, in London, was born by the shareholders.

Over and over again it has been stated that the Com
ought not to have charged for what was not received
consumer; does anyone suggest that an authority wo
like case have remitted their charges? With the best
the world they could n ve done so.

Arguments against t rchase of the water compani
against the introdu a water supply from Wales
be multiplied indef ly, but they may be shortly summ
as follows:—

It is undesirable to ha l over to a practically irresp
authority, whose acti nnot be controlled by the
consumers or rate he undertakings of Compani
are subject to a ve nd unusual amount of contro

It is contrary dictates of common sense
£57,000,000 for w can be obtained equally satisfactor
£18,000,000.

It is unwise to go to les for a supply of Water unt
supply which passes our s is exhausted; and as a pop
of at least 18,000,000 persons can be supplied from the T
and Lee and from wells, without putting any strain on
sources of supply, and as it is doubtful, to say the le
London will ever contain 18,000,000 of persons, the
further afield for the purpose of supplementing the
may very properly be postponed until the future requir
of London, beyond the population referred to, can be est
with some degree of certainty.

Should the ratepayers of London persist in the introd
of a supply from Wales, they would regret it once onl
that once would last as long as they live.

Major LAMOROCK FLOWER (Sanitary Engineer to the Lee Conservancy Board) said that this valuable paper had for its keynote a very important personage, and that was the ratepayer. During the whole of it Mr. Middleton had persistently referred to the ratepayer —the person who so to speak had to "pay the piper." With regard to the engineering part of it, that had been very fully and entirely threshed out. He had the honour of being a witness at Lord Balfour's Commission, and that Commission came to the conclusion that what was wanted was, not to go to another source for the water supply of London, but to take care of that which we have. The Staines Reservoir scheme, which his friend Mr. Hunter brought forward on that Commission, was adopted for storing water for London which was supposed to be wasted. The Staines Reservoir scheme was being carried out, and when completed he did not think that the Companies would have to complain of want of water from the Thames. With regard to going to Wales, it might be very nice, but, as Mr. Middleton justly said, how do we know that we should get pure water from Wales? Has anybody here seen a Welsh stream in flood? How would London people like to drink peaty water? Again, the water of London is said to be hard; no doubt it was hard, but it was very healthy. London stood a long way before any other town in regard to its public health. Now, if they had the Welsh water they would have soft water, and those who have studied the subject knew the effect of soft water upon lead. He thought that if they had been going to build a new London they might perhaps consider the advisability of going somewhere else for water; but so long as present conditions remained, and so long as they had a good supply, let them take care of what they had, and be very thankful that they had so large and valuable a subterranean reserve in the watersheds of the Thames and Lee.

Dr. CHRISTOPHER CHILDS (London) remarked that he had attended the meeting with the object of listening rather than of speaking. Especially he had looked forward to hearing criticisms of the arguments contained in Mr. Middleton's excellent paper; but apparently those criticisms were not forthcoming. The chief question with regard to the paper was a question of figures, viz., of those figures brought forward by Mr. Middleton to prove that the watershed area of the Thames would be sufficient to supply the future generation with water some fifty years hence, even though the population continued steadily to increase. Of course he did not doubt the author's integrity in the matter, but one was always at liberty to doubt the judgment of an authority however eminent that authority might be. He could not venture to express an opinion with regard to those figures, but he would be glad for the sake of information to hear some criticism of them. If those figures were correct, then it must be admitted that Mr. Middleton had made out a good case for the water supply from the watershed area of the River Thames so far as quantity was concerned. The quality of the supply was a matter of still greater

importance. Lord Balfour's Commission had sat for a very long time, had examined a large number of competent expert and eminent witnesses, and had made a very searching enquiry into the conditions of the River Thames and River Lee. They had come to the conclusion that as far as the quality of the water supplied from these rivers (after sedimentation and filtration) was concerned, we had what might be called an exceptionally pure water supply. It was true Dr. Klein and others had shown from the results of bacteriological examination that there were some traces of possible sewage contamination to be found in the London water supplies, even after they had undergone the usual process of sand-filtration. But these traces were infinitesimally small, and they were not satisfactory enough, on what might be called theoretical grounds, to condemn the London water supply. Let them turn next to the evidence derived from the returns of mortality and sickness from those diseases which we recognise as conveyable by water, *i.e.*, to the mortality and sickness due to typhoid fever in London, as compared with other places. The mortality from typhoid fever in London was proverbially low. Mr. Shirley Murphy had compared the typhoid mortality in London with that of fourteen other large cities of the kingdom, which had their drinking water supplied from sources which could not be contaminated by sewage in any way, and showed that London compared very favourably with the great majority of those cities. It might be objected that this kind of argument had been urged again and again with regard to places which had long remained free from typhoid, and yet were eventually invaded by a typhoid epidemic; and he could not help recognising the possibility that by some combination of circumstances—such as defective filtration occurring at the same time with an unusual and extraordinary amount of pollution of the river—an extensive outbreak of typhoid might be caused in London. On the other hand, it must be remembered that the observations with regard to London's comparative freedom from typhoid have extended over many years. The conditions of London in this respect might be regarded as that of a gigantic experiment carried on over a long period of time upon many millions of individuals: the results showing that little or no typhoid fever had been conveyed through the existing water supplies. The majority of the Commission of 1868 came to the conclusion at that time that the water supply of London was quite reasonably safe. In 1894 Lord Balfour's Commission were unanimously of the same opinion. Let them look at the changes and improvements which had taken place in these watershed areas since that time; at the effects produced by the Thames and Lee Conservancy Acts; at the amount of pollution which was continually being stopped and removed. These appeared to be strong arguments in favour of adhering to our present system, and getting our supply from the great watershed area in our immediate neighbourhood rather than going to Wales to rob it of some of its beautiful streams. This scramble for the possession of watershed areas in our mountainous districts was becoming a very serious matter, and if London joined in, every other town and city of the kingdom would be justified in trying

to grab the springs and sources of our rivers. One other point should not be lost sight of in considering the possibility of supplying water from the Welsh mountains, viz., the solvent action of many peaty waters upon lead pipes. It would be well to ask the gentlemen responsible for the introduction of such water to assure us that, whilst they propose to slightly reduce our typhoid mortality, they were not going to poison us freely with lead.

Dr. WILLOUGHBY (London) remarked that he could not view without misgiving further drafts on the deep waters of the London basin through the sinking of wells. Vast as was the store of water beneath London it was not inexhaustible, and would be reduced if the quantity abstracted were in excess of that added yearly. The effect was already seen in the lowering of the water in wells and the drying up of rivulets. But if they had to go further afield for water, there was one source of supply which he did not think had been adequately recognised, viz., the South Downs, under which a large part of the surface drainage of the Wealden clay found its way through fissures in the chalk or through the greensand, and ran to waste into the sea. The quantity was far greater than could possibly be explained by the rainfall on the chalk itself. The Brighton Corporation had made efforts to tap these waters with various degrees of success, but they eventually struck one of these fissures and found more than they could appropriate. During the sinking of a shaft in the Kent Coal Fields one of these springs was struck, with the result that several men lost their lives; and such underground streams were not uncommon in limestone districts, even when so arid as the deserts of Colorado and Texas. He had recently read an account of one discovered in driving a tunnel at Milwaukee, which yielded 50,000,000 gallons a day. We had similar but not so large springs along the coast from Portsmouth to Eastbourne, and probably from Dover round to the North Kent coast, flowing under the chalk into the sea, giving supplies that the towns in the south could not possibly require, and which might be utilised for London. This meant going a distance of fifty miles instead of 180, and thorough pumping would be necessary. This source was in his opinion worth consideration. The hardness of the water, though rendering it ill suited for steam raising and other trade purposes, was not an unmixed evil, for the observation of Forberg on school children in Sweden, and of C. Röse on Bavarian recruits, showed that the proportion of defective teeth in a district was in direct ratio to the softness of the water, *i.e.*, the absence of salts of lime.

Mr. RUMSBY regretted his inability to endorse the views entertained in the paper, which seemed to him to be devoted more to financial than sanitary considerations. He thought they ought to deal with the subject from a sanitary point of view, and hence believed it was good policy to go to Wales rather than take a further supply from the Thames. There were two points in Lord Balfour's Commission which stood out prominently: first, that no

water should be taken from the Thames until 15 days after a flood, the reason being that the washings from the fields were likely to be impregnated with manure; the second point was that a minimum supply of 200 million gallons must pass over Teddington Weir, because as it stands now the river is not self-purifying. Now, in the last three or four months of 1898 the total amount of water coming down the river was, on a certain day, only 175 million gallons—not the quantity of water the Commission advised was necessary, the consequence being that the depth of the river was only 2 ft. 6 in. It was to be remembered that Lord Balfour's Commission sat in 1896. Dr. Frankland found that in a cubic centi metre of water there were 160,000 microbes. Manchester, Liver- pool, and other provincial towns, were rapidly acquiring the goo watershed areas, and he thought it behoved the metropolis not t leave it too late before obtaining a first-rate source of supply.

Mr. E. A. Brayley Hodgetts (London) remarked that the las speaker had referred to the presence of microbes in water, but the must remember that it was given on the authority of an eminen scientist, that unless we drank microbes, and breathed microbes, w should not be alive. Life was found to be everywhere. Natur abhorred a vacuum, and wherever nature existed, there was life. I did not follow that because there were so many microbes in th water, the water was necessarily dangerous to health, and in th connection he rather thought it very possible that water which ha passed through a great many miles of aqueducts, shut out from lig and air, would generate microbes that might be poisonous. A litt while ago an instance in this connection was supplied by the Gre Junction Water Company. It was discovered that the wat supplied by the Company was absolutely as pure as it could possib be, but at one particular rising main that water became contaminat with bacteria. The mains were a very prolific source of contami ation, and in carrying pipes all the way to Wales this should be bo in mind. It would not be surprising under those circumstances the last state of London was worse than the first. Mr. Bray Hodgetts then referred to a new work by Mr. J. W. Hill, American Engineer, of the town of Cincinnatti, on the Purificat of Water Supplies of Cities and Towns. This gentleman was impartial person, and had travelled all over Europe and the Un States of America to collect statistics. Shortly, the result of i was that the author took the typhoid death-rate as a standar gauge the purity of a water supply. Applying that standard to principal towns of England, it was found that London water was best water supplied in any town in England. Its excellence attributed by this authority to the wise methods of filtration adop by the Companies. Cities which have their water supply alre from Wales, in the tables prepared by this gentlemen occupie lower place than London, and therefore it seemed to be rat absurd to advocate a proposal which might have the effect of destr ing some of the advantages we enjoy to-day.

Dr. CHILDS remarked that he was unable to allow this bacteriological aspect of the question to pass unchallenged. He would urge the public not to be frightened by the terrible bogey of 150,000 microbes per cubic centimetre of unfiltered river-water. How many microbes did they think they drank in the morning milk? They were not counted by the thousand, but by the million. It was not a matter of the quantity of the bacteria which we drank in our milk or water, but it was a question of their quality. We were taking bacteria into our systems every day with everything we ate and drank. Our river waters teem with microbic life, but when they were duly subjected to careful sand filtration it had been shewn over and over again that they were to be then counted only by tens and hundreds.

The CHAIRMAN (Sir Douglas Galton) asked the meeting to accord a vote of thanks to Mr. Middleton and Mr. Hunter for the excellent paper presented to them. The fact was, Mr. Middleton treated the question mainly or largely on the financial side; and with regard to the sanitary aspect of the question, he thought it had been abundantly shown that the filtration of water, as practised in London, gave a most admirable water supply at the present time. Now had any strong evidence been forthcoming to show why, under these circumstances, we should go to the enormous expense of drinking water from Wales? They would all wait with great interest for the report of Lord Llandaff's Commission, which was inquiring into the matter, and perhaps that Commission might show the reasons why we at the present time should begin these large works. He, for his own part, confessed to inclining to the view that it is more prudent for us to be satisfied with the Thames area, and to improve, as far as we can, the water obtained from that area by storing it and by removing those sources of pollution which exist in the Upper Thames Valley and in the Valley of the Lee. Year after year we largely improve the quality of the water by stopping pollution. Then they all knew well what that bogey of bacteria was; and he could agree with Dr. Childs in his remarks, for unquestionably the bacteria were kept in check very largely by sunlight and by filtration. For himself, however, he should prefer to improve the means we had at hand already, instead of incurring this vast expenditure that was being proposed by Sir Alexander Binnie. He had much pleasure in proposing a vote of thanks to Mr. Middleton, and to the reader of the paper.

Mr. OSBORNE SMITH formally seconded the motion, which was carried with acclamation.

Mr. WALTER HUNTER (London), in acknowledgment, said he was sure Mr. Middleton would be gratified at the cordial vote of thanks that had been passed. There were one or two points in the discussion on which he would like to say a few words. The estimates for the Welsh scheme differed on both sides, and there was no need

to go into the figures again, for they were already well before t public. So far as his knowledge went he was strongly of opini that the Thames supply could be utilised for the purposes of Lond at very much less expense than any scheme for getting water fr a distance would necessarily involve. With regard to Lord Balfo Commission, he thought the gentleman who had criticised the pa was under some misapprehension as to what that Commiss actually reported. They reported that the water for drinking p poses was excellent in quality and sufficient in quantity. Th were the very words used. In regard to the question of bacte he could say that only that day he had received from Sir Will Crookes and Professor Dewar their report on the analysis of w taken from the Grand Junction Company last week, and the ave at Hampton was 16. But after all, as Dr. Childs had very prop said, the question of bacteria was a perfect bogey. As Sir Will Crookes had said at Bristol lately, a friend of his had this craz bacteria upon him, and he put his children upon sterilised food sterilised water, and he found that they did not thrive nearly so as they did upon ordinary food and ordinary water, and he obliged to let them return to ordinary diet. He would like to p out that Lord Balfour's Commission never said that 15 days' f should be allowed to pass by. It was the engineers who prop the Thames scheme, themselves, who suggested it, but they did say whether it was necessary or not. He had come to the conclu that to allow fifteen days to go by is a waste of the resources w a bountiful Nature has put at our very feet, for supplying necessities of London in regard to its water supply. That tim fifteen days was simply put in because somebody at the Local Gov ment Board happened to say so at the time; as it was bette propitiate everybody they fell in with the view. But there wa logical reason for it. Only the other day, Professor Crookes Professor Dewar said that the flood water might be taken wit the least harm to anybody. Speaking of this chemical examin and bacteriological examination he did not know whether were aware that the Thames water as delivered into Lond remarkably pure. Mr. Rumsby referred to Sir Edward Frank than whom there was no greater authority in England. Nov Edward Frankland had said in one of his reports that i wished to assimilate into our bodies one grain of solid matt London water, we should have to drink 5,000 tumblers of it. regard to Sir Benjamin Baker and Mr. Deacon's report, they sh that to bring the first instalment into London would cost a £400,000 a year additional to that which Thames water would Mr. Hunter then proceeded to controvert the idea that none o London Companies had come to the aid of the East London Com last year, and explained that directly the trouble arose, the engi of the various Companies consulted, with the result that a sc for intercommunication was presented to the Royal Commission sitting. This scheme had been practically accepted, and a Bil now before Parliament to enable one Company to supply any

Company at any time. So that the necessity of any district in the metropolis would be satisfied even if such an exceptional drought as that of 1898 were to occur again. Mr. Hunter complained of the opposition that was always made to the schemes of the Water Companies for benefiting the consumers, and said that every obstacle was put in their way in order to depreciate the property of the shareholders of the Company. Knowing what he did, he knew of no body of men who more earnestly desired to carry out the duties which had been committed to them to the benefit and satisfaction of the consumers than the directors of the different Water Companies of London, because they knew that in that way they were serving the best interests of their shareholders. He would not put it on any higher ground than that. Statistics had been laid before the Royal Commission proving that so far as health was concerned London was in a far better position than nineteen or twenty other towns which were supplied with mountain water. He had no particular predilection for either one water or the other, but considering the question of the relative expense of bringing water from Wales, and of obtaining it from the Thames, he could not help thinking that the ratepayers would be very foolish indeed if they did not take that point into their earnest consideration. If the enormous cost of a supply from a distant source gave them, as he had shown, no better water, they had much better stop as they were. And he believed that the present water supply of London was at the present equal in quality to any other water supply in the world.

[illegible] OF [illegible] ABATTOIRS [illegible] IN RELATION [illegible] OF TUBERCULOSIS.

[illegible] M.D., D.P.H. [illegible] and St. Olave's, [illegible]

([illegible])

([illegible])

[illegible] upon Dr. Bond [illegible] tuberculosis [illegible] that it is to [illegible] had been one of [illegible] It had formed for them a fresh [illegible] "Little Englanders"; they [illegible] of acquiring [illegible] and so far as tuberculosis [illegible] into the subject. [illegible] and they had had [illegible] Thorne Thorne, [illegible] had now a society for the [illegible] The subject, therefore, he thought, [illegible] to be read to them that evening. [illegible] information upon it they still required more. [illegible] that the public—the lay public—should know the real facts of the case before they jumped, as they frequently did, to a conclusion, which possibly was a wrong one. In his capacity as a member of another body the matter had come before him, and he did his best to promulgate the views he entertained; to explain all that in detail, however, would be somewhat anticipating the paper. But in the phrase of a distinguished man, who was happily recovering from a serious illness, he could say "that is another story," on which perhaps in a later part of the evening he would have an opportunity of saying something. At any rate, The Sanitary Institute had chosen for the paper that night a gentleman particularly well qualified to speak to them on that subject, for he was the medical officer of health to a district adjoining one of the largest meat markets in London. He would be able to tell them from his own observation and experience the harm or the good of meat passing into London in its killed condition. He would now ask Dr. Bond to read his paper.

Dr. Bond said:

I ONLY consented to read a paper on this subject, at short notice, on the understanding that an elaborate paper was not

required, and that a *Discussion* on the matter was what was principally desired.

I wish I could have had more time to do justice to the importance of the subject. This importance is shown by the recommendation relating to London of the last Royal Commission on Tuberculosis, which is the following:

> It appears desirable that in London the provision of public in substitution for private slaughter-houses should be considered in respect to the needs of London as a whole, and in determining their positions regard must be had for the convenient conveyance of animals by railway from the markets beyond the limits of London, as well as from the Islington market, to the public slaughter-houses which should be provided. At the present time no administrative authority has statutory power authorising it to provide public slaughter-houses other than for the slaughter of foreign cattle at the port of debarkation.

Also by the general recommendations for Great Britain and Ireland, which may be thus briefly summarized.

When any local authority has provided a public slaughter-house power should be conferred on it to prohibit slaughter in any other place, except that a period of *three* years be allowed to the owners of existing registered private slaughter-houses to apply their premises to other purposes; also to require *all meat* brought into the district to be inspected, and reasonable charges made for this inspection. Also that the joints of all carcases passed as sound shall be *stamped;* and that it shall not be lawful to offer for sale the meat of any animal which has not been killed in a duly licensed slaughter-house.

No person is to be permitted to act as a meat inspector until he has passed a qualifying examination; and that the Local Government Board should issue instructions for the guidance of meat inspectors as to the seizure of a carcase or a part thereof.

As this paper is to deal especially with Public Abattoirs in relation to the prevention of Tuberculosis, and the remarks of some members of the various London Butchers' Associations indicate that the conclusions of the former Royal Commission on Tuberculosis which, reported in 1895, are still imperfectly known by butchers, it seems desirable to definitely state them, viz.:—

Recapitulation.

> 77. To recapitulate the information we have obtained from the witnesses who favoured us with their experience,

and from the researches of our three enquirers, together with our own conclusions :—

We have obtained ample evidence that food derived from tuberculous animals can produce tuberculosis in healthy animals. The proportion of animals contracting tuberculosis after experimental use of such food, is different in one and another class of animals; both carnivora and herbivora are susceptible, and the proportion is high in pigs. In the absence of direct experiments on human subjects, we infer that man also can acquire tuberculosis by feeding upon materials derived from tuberculous food-animals.

78. The actual amount of tuberculous disease among certain classes of food-animals is so large as to afford to man frequent occasions for contracting tuberculous disease through his food. As to the proportion of tuberculosis acquired by man through his food or through other means, we can form no definite opinion, but we think it probable that an appreciable part of the tuberculosis that affects man is obtained through his food.

79. The circumstances and conditions with regard to the tuberculosis in the food-animal which lead to the production of tuberculosis in man are, ultimately, the presence of active tuberculous matter in the food taken from the animal and consumed by the man in a raw or insufficiently cooked state.

80. Tuberculous disease is observed most frequently in cattle and in swine. It is found far more frequently in cattle (full grown) than in calves, and with much greater frequency in cows kept in town cow-houses than in cattle bred for the express purpose of slaughter. Tuberculous matter is but seldom found in the meat substance of the carcase, it is principally found in the organs, membranes, and glands. There is reason to believe that tuberculous matter, when present in meat sold to the public, is more commonly due to the contamination of the surface of the meat with material derived from other diseased parts, than to disease of the meat itself. The same matter is found in the milk of cows when the udder has become invaded by tuberculous disease, and seldom or never when the udder is not diseased. Tuberculous matter in milk is exceptionally active in its operation upon animals fed either with the milk or with dairy produce derived from it. No doubt the largest part of the tuberculosis which man obtains through his food is by means of milk containing tuberculous matter.

81. The recognition of tuberculous disease during the life of an animal is not wholly unattended with difficulty. Happily, however, it can in most cases be detected with certainty in the udders of milch cows.

82. Provided every part that is the seat of tuberculous matter be avoided and destroyed, and provided care be taken to save from contamination by such matter the actual meat substance of a tuberculous animal, a great deal of meat from animals affected by tuberculosis may be eaten without risk to the consumer.

83. Ordinary processes of cooking applied to meat which has got contaminated on its surface are probably sufficient to destroy the harmful quality. They would not avail to render wholesome any piece of meat that contained tuberculous matter in its deeper parts. In regard to milk we are aware of the preference by English people for drinking cows' milk raw, a practice attended by danger, on account of possible contamination by pathogenic organisms. The boiling of milk, even for a moment, would probably be sufficient to remove the very dangerous quality of tuberculous milk.

Also 39 . . . . there is always a difficulty in making sure of the absence of tuberculous matter from any part of a carcase that shows evidence of tubercle elsewhere.

Dr. Sims Woodhead stated that a man might eat a sufficiently large quantity of tubercular meat containing tubercle bacilli at one meal to induce tuberculosis.

Dr. Klein has made experiments which show that *bovine* tubercular matter is much more virulent to animals generally than *human* tubercular matter.

These experiments were confirmed by those of Dr. Sydney Martin, who also obtained some very valuable and interesting results. It will be best perhaps for me to quote from an original contribution by him which I recently had the pleasure of hearing, and which is just published in the "Journal of State Medicine," the official organ of the Royal Institute of Public Health.

The parts of the body which are affected by the disease after infection are very varied in individual cases, and this variability, which in former times led to great misconception as to the nature of the disease (which was described as arising in the body, for example), led undoubtedly to a delay in the acceptance of tuberculosis as an infective disease. There are cases, for example, which are readily

explained, such as primary pulmonary tuberculosis and primary intestinal tuberculosis, in the former of which the infective material is evidently inhaled, in the latter of which the material is swallowed, and produces ulceration of the small intestine, affecting secondarily the mesenteric glands. There are other cases of tuberculosis which are, however, not so readily explained. These are the cases of scrofulous glands in the neck, of tubercular peritonitis without intestinal ulceration, and cases of so-called remote tuberculosis, "primary" tubercular meningitis, or tubercular disease of the joints and bones. The experimental study of the disease explains in great part the anomalies in the distribution of the lesions in the human subject. A single dose of tuberculous material given with the food to a healthy pig will, if large enough, produce intestinal ulceration, subsequent infection of the mesenteric glands, and of other glands in the abdominal cavity, followed by a general infection of the body. A smaller dose will produce no ulceration or sign of infection of the mucous membrane of the intestine, but will produce enlargement of the mesenteric glands, and perhaps affect no other part of the body. This important fact—namely, that a small dose of tubercular virus may infect the internal organs of the body without producing a lesion in the mucous membrane by which it is absorbed—was well illustrated in many experiments of the Royal Commission. From a practical point of view the reproduction of scrofulous glands in the neck was as important as any of the results. Thus with a large dose of tubercular virus given to the pig ulceration of the tonsil might result, with infection of the glands below the jaw, and then a general infection of the body. With a smaller dose there was no ulceration of the tonsil, but the glands below the jaw were infected, and subsequently the glands of the neck, and then the lungs. With a still smaller dose in one case, and also in a calf, the glands below the jaw were alone affected, there being no affection of the tonsil or of the body generally. The second and third classes of experiment reproduced cases which are continually occurring in human beings, namely, scrofulous glands of the neck, occurring either by themselves or associated with tuberculosis of the lungs. After the administration of a large dose of the tubercular poison the disease progressed gradually, but with certainty. It is not unfrequently seen with smaller doses that the disease, after infecting one or the other part, appears to remain stationary for a long time; but even when remaining stationary

for months the lesions produced are still infective, as is frequently seen in the human subject. These lesions may lead to a generalization of the disease. Too much stress cannot be laid on this point as an explanation of the cases of so-called remote tuberculosis. In some of these cases in man—such as cases of tubercular meningitis, bone and joint disease—there is found an old lesion, maybe not larger than a pea, at the apex of one lung, in a mesenteric gland—the glands below the jaw or in the bronchial glands—and there may be no lesion, old or recent, in the mucous membrane of the alimentary tract to show the point of absorption. There are cases in which the primary local lesion has retrograded, but still remained infective, the infective material being absorbed into the circulation, and conveyed to the meninges or to the joints and bones. In the other cases careful search has not revealed any local lesion in the body, and these must be cases in which the tubercle bacillus is absorbed accidentally directly into the circulation.

Tuberculosis is exceedingly prevalent among *cows*, the reports of various continental and English public abattoirs showing that it is generally 40 to 50 per cent. of the animals slaughtered.

At Copenhagen during the four years 1890–3 inclusive, 15·3 per cent. of the *swine* slaughtered showed evidence of tuberculosis. The disease is, however, but little prevalent among sheep and calves.

These facts, particularly those relating to cows and swine, render efficient inspection a necessity, and inspection to be efficient must take place at the time of slaughter, as it is only then that *the organs* belonging to the animal can also be adequately inspected.

Public abattoirs were considered most desirable by numerous witnesses who were called before the recent Royal Commission on Tuberculosis.

In addition to many medical officers of health, veterinary surgeons, and meat inspectors, were the following witnesses representing the interests of stockowners and butchers.

Mr. B. St. John Ackers, Chairman of the Cattle Diseases Committee, Central and Associated Chambers of Agriculture.

Mr. J. Bell, President of the Carlisle and District Butchers' and Insurance Association.

Mr. James Scarlett, Secretary and late President, and Mr. J. Lang, President of the Paisley United Fleshers' Society.

Mr. J. Dobbie, Representative of the Scottish Chambe Agriculture.

Mr. J. J. Ward, Wholesale and Retail Butcher, Middle Lancashire.

Others admitted that the existence of public abattoirs w increase the efficiency of inspection of meat.

In addition to the inspection of meat slaughtered in public abattoirs, there will still remain the need for inspec of carcases brought from other districts. I will quote from Report of the last Royal Commission on Tuberculosis, p. 11

31. In every district in which a public slaughter-h has been provided, it will be possible for the local autho to ensure the inspection of the carcases of all ani killed within it. There will still remain the need inspection of carcases brought from other districts wl the animals have been killed. We think that every l authority should be prepared to receive into its dist without further inspection, meat which, having been ki in the public slaughter-house of another authority, already been subjected to inspection and approved, which bears sufficient evidence of such approval. every local authority should be empowered to provide i district one or more stations, and to require meat t brought there for inspection which has not been previo inspected elsewhere. Foreign meat should, we think, be required to bear mark of inspection and approval at time of killing, and steps should be taken through cons and other agencies to ascertain from time to time there was efficient inspection at foreign slaughter-ho of meat intended for transmission to this country.

32. We desire to add that, in some public slaugh houses in the United Kingdom, serious physical difficu exist in the way of efficient inspection. The preva practice in the best continental abattoirs is to slaug the animals in a common large, well-lighted, well-equi hall. The inspector passes up and down, the offal is dr out, close to the animal it belongs to, and exposed in view. But in this country each butcher usually slaugh in a separate chamber, often extremely ill-lighted, an some instances the offal of several animals may be thrown in a heap, so that it is impossible to distinguish parts of one animal from those of others.

I am of the opinion that, with efficient inspection of all n as now mentioned, properly constructed public abattoirs w

be advantageous to the stockowner, the butcher, and the consumer, for the following reasons :—

1. To the *stockowner*, because—

(*a*) Increased inspection would make him try to eliminate tuberculosis and other diseases from his stock, and thus diminish his losses.

(*b*) In London some 5,000 butchers, instead of only some 450 who have private slaughter-houses, would have the opportunity, if they so desired, of slaughtering home-fed animals.

(*c*) The consumer would know home-fed meat and have a guarantee that it had been passed as sound, so that there would be increased demand for such meat.

2. To the *butcher* who dealt in home-fed meat because—

(*a*) Of the increased demand for it.

(*b*) The monopoly of those having private slaughter-houses would be prevented.

(*c*) His losses, especially in summer and muggy weather, would be much diminished as his meat could be well kept, until required for sale, in the cooling chambers or cold-air stores provided in the public abattoirs.

(*d*) His heavy expenses for *ice*, especially during the summer, would be diminished, and his savings from this alone would more than pay for the small sums that would be charged for the cooling chamber.

3. To the *consumer*, especially to the poor, because he could ensure a meat supply wholesome and free from disease, especially tuberculosis. The additional cost, if any, would be so infinitesimal that it may be neglected.

On account of the enormous population of London, the efficient inspection of all meat coming into it would make stockowners careful to eradicate tuberculosis from their herds, and in this way the *milk* supply would also be much improved, and therefore *human* tuberculosis would also be diminished.

This diminution of tuberculosis would be the greater the more universally the recommendations of the Royal Commission were carried out.

There are many other reasons for providing public abattoirs. Dr. A. E. Harris, M.O.H. to the Islington Vestry, has thus stated them :—

1. Hygienic Reasons.

(*a*) That the erection of such buildings would remove nuisances from the neighbourhood of dwelling houses.

(*b*) That it would exclude putrifiable matter from the sewers.

(*c*) That it would protect meat from the liability to exposure from foul emanations.

(*d*) That it would ensure the thorough examination of all meat for disease.

(*e*) That it would materially tend to limit the traffic in diseased meat.

2. Economic Reasons.

(*a*) That the meat would be less liable to spoil, because slaughtered under better conditions.

(*b*) That much blood and offal now lost would be entirely saved.

(*c*) That there would be a saving from order, the proper division of labour, avoidance of driving animals through the streets, and the doing of business on a large scale.

(*d*) That abattoirs properly managed yield a fair profit.

3. Humanitarian Reasons.

(*a*) That much of the cruelty to animals that now occurs would be put an end to, owing to the use of improved appliances for slaughtering.

(*b*) That the driving of weary and exhausted cattle through our streets would be avoided, owing to the abattoirs being situated near railway stations.

(*c*) That the street danger to the public would be greatly lessened, if not altogether eliminated.

To these I would add:—

That diseased meat could be more profitably dealt with, *e.g.*, by sterilization, &c.

For instance, in 1895, in the 307 public slaughter-houses in Prussia, of the 662,164 cattle slaughtered, 12·7 per cent. were found to be affected with tuberculosis; but of these only $4\frac{1}{2}$ per cent. were totally condemned, and a still smaller percentage were partially condemned; so that over 90 per cent. of those affected with tuberculosis were able to be sold after sterilization to poor people at a low price. Moreover, the demand for such meat is generally greater than the supply.

I will now give a short account of my experiences in Holborn, which show the necessity for the efficient inspection of all meat and the provision of public abattoirs.

If time permits I will then deal with the objections that have ›en raised against public abattoirs, the various requirements of

a good abattoir, and other details as to cost for slaughtering the different animals in various Continental and British abattoirs, &c.

I am glad that the Architect to the London County Council (Mr. Thomas Blashill) has kindly consented to be present, and show on a large scale a sketch for an up-to-date abattoir. He will be able to give you the results of his personal experience, and enter into details of cost of construction, &c., which I could only do from information received.

Personal Experiences in Holborn.—About one-third of the diseased meat "seized" has been for tuberculosis. This meat has come from very many counties of England, and some also from Scotland, Holland, and Belgium. I may mention the counties in the order in which the amount of diseased carcases have come from different towns and villages in the counties respectively, beginning with the county from which the largest amount has been "seized."

Devonshire, Lincolnshire, Essex, Somerset, Norfolk, Cambridgeshire, Suffolk, Cornwall, Surrey, Derbyshire, Leicestershire, Bedfordshire, Dorsetshire, Hertfordshire, Sussex, Middlesex, Wiltshire, Northamptonshire, Kent, Cheshire, Gloucestershire, Staffordshire, Rutlandshire, Herefordshire, Buckinghamshire, Oxfordshire, Berkshire, Hampshire, and Yorkshire.

Nearly all the tubercular carcases seized were *cows;* a few were pigs or oxen. The average weight of these cows was under 350 lbs.

In the first quarter of the year 1896, at the beginning of which the meat inspector began his duties, there were more than 4,000 stones of diseased meat seized, or at the rate of more than 16,000 stones per annum. This is *exclusive* of diseased *offal.*

Legal proceedings were taken against many of the offenders, and in a very large majority of the cases fines or imprisonment were inflicted.

For several years prior to the appointment of this special meat inspector there had not been a single conviction obtained for exposing or depositing for sale diseased meat.

These facts prove the necessity for efficient inspection.

The enormous area and population of London made it desirable that there should be at least six public abattoirs.

In Glasgow, the second city of the United Kingdom, there are *three;* in Manchester, another very large city, there is but *one;* and in both the system has been a financial success.

The Royal Commission states—Part II., p. 341—that all the public slaughter-houses in Germany are self-supporting.

The slaughter-house charges vary in different towns.

	Cattle.	Calves.	Sheep.	Lambs.	Pigs.
	s. d.	s. d.	s. d.	s. d.	s. d.
Glasgow	0 9	0 1½	0 1½	0 0¾	1 0
Manchester	1 6	0 4	0 2	......	0 6
Liverpool	1 6	0 6	0 1½	......	0 6
Leeds	1 0	0 4	0 3	......	0 3
Germany	2/- to 5/-	4d. to 1/- (Reckoning	4d. to 1/- a Mark as a	...... Shilling.)	1/- to 2/-

Osthoff also gives the charges made for weighing, inspection and lairage, that for the first day being free. Also details respecting the cost of erection of the public slaughter-houses, with or without cooling chambers, and the charges made for the use of the latter, which are from 14s. to 40s. per annum per ten square feet.

In the best modern slaughter-houses the slaughtering is done in large halls, separate halls being provided for cattle, for sheep and calves, and for swine; also a small one for diseased animals. Associated with the slaughter-house is the cattle market, and both are in direct connection with the main railway lines. On the premises also are buildings for carrying out the various processes incidental to slaughtering, such as fat melting, bone boiling, gut scraping, and the extraction of the albumen from blood, etc. In the newer slaughter-houses there are large cooling rooms, and provision for microscopical and pathological examinations, &c.

I will now deal with the *objections that have been raised against public abattoirs.*

Of the witnesses who gave evidence before the late Royal Commission on Tuberculosis, even the very few who thought that public abattoirs were not desirable, confessed that their existence would *increase the efficiency of inspection of meat.*

I may name—

Mr. W. Field, M.P., President of the National Federation of Butchers and Meat Traders' Associations.

Mr. W. Haydon, L.C.C., President of the London Butchers' Trade Association.

Mr. W. Cooper, Chairman of the Meat and Cattle Section, London Chamber of Commerce.

Private slaughter-houses are said to be more convenient to the butcher. As I have previously mentioned, there are about 5,000 butchers in London, and of these less than 450 have private slaughter-houses, so that the abolition of these latter could not certainly cause any *in*convenience to the great ma-

jority—*more than 10 to 1*—who do not possess them. The greater number of these have to go several miles to get their meat at the Central Meat Market, or Deptford. And of those that have private slaughter-houses many have to go several miles to the Cattle Market, Islington, or other markets, and have the animals driven through the streets. Moreover, those who have private slaughter-houses generally sell other meat in addition to that of their own killing.

In Belfast, where the number of private slaughter-houses has been reduced from 30 to 5, many of the butchers who do not slaughter in the public abattoir have had private slaughter-houses built *outside* the city, *where the inspection is not so rigorous*, and on that account willingly put up with the inconvenience of sending their men a long distance to do their slaughtering.

In Glasgow, where private slaughter-houses have been abolished, the butchers now express a strong preference for the public slaughter-houses over the old system.

Another objection is that *meat killed in a private slaughter-house keeps better and retains its freshness better than meat killed in a public slaughter-house.* A similar objection was raised by Mr. Hart, of the Central Meat & Poultry Markets Association, who urged that the establishment of public slaughter-houses, requiring greater handling and carriage of recently-killed meat, would "destroy the unique characteristics of home-killed meat."

These and many other objections have been so admirably answered by the Medical Officer of Health for London, Mr. Shirley Murphy, that I cannot do better than quote from a printed report;* and at the same time I desire to express my gratitude to him for lending me books on subjects connected with this paper, and for much valuable assistance.

An extract from one of Sir Richard Thorne's Harben Lectures, which I had the pleasure of hearing, will make a suitable ending to this paper:—

> How is the very proper demand of the butchers for uniformity in the conditions regulating the seizure of carcases on account of tuberculosis to be met? How is such skilful handling of slightly tuberculous carcases to be attained as will secure the removal of the diseased portions in such a way that no risk shall attach to the remainder? I only know one answer, namely, by the abolition, as far as practicable, of private slaughter-houses, by the provision in all large centres of population, whether technically styled urban or rural, of public slaughter-houses under the direct

* Report by the M.O.H., L.C.C., on proposed abolition of private slaughter-houses in London. P. S. King & Co. London, Nov. 1898. Price 2d.

control of the sanitary authorities and their officers, and by the adoption of measures which will, as soon as practicable, provide a class of skilled meat inspectors.

The properly administered public slaughter-house is demanded as an act of justice to those trading in meat; it is demanded in the interests of public health and decency; it is demanded for the prevention of cruelty to the lower animals; and it is demanded in order to bring England, if not the United Kingdom, somewhat nearer to the level of other civilised nations in this matter.

Public slaughter-houses, officered by skilled inspectors, and supervised by medical officers of health, are urgently required, amongst other reasons, for the prevention of tuberculosis in man.

Mr. T. Blashill (London) said that at the request of Dr. Bond he had great pleasure in showing a sketch plan of an abattoir, which he thought would be suitable for a small town, or for a district in the suburbs of London. It contained the whole of the elements usually found in German abattoirs, where the market is not attached to the slaughter-house. He had not made any provision in the plan for the sale or traffic in cattle, and he offered no opinion as to the necessity, or otherwise, for public slaughter-houses. He was an architect, and observing how these things were done on the Continent, had applied his knowledge to the subject. In response to a request of a Committee of the London County Council, he had, as their architect, visited a good many abattoirs on the Continent, and had to thank Mr. Shirley Murphy, their Medical Officer of Health, for a good many ideas on the subject which had facilitated his work. Turning to the exhibited plan, Mr. Blashill pointed out that the site was model in shape—a square piece of ground open on one side to the public road, by which animals might be brought in, and open on the other side to the siding of a railway—the greater part of the animals coming by the railway probably. The chief entrance on the street would be for persons coming upon business. Assuming the cattle arrived by rail, there were a number of pens into which they were received in the first instance; there the veterinary inspectors could see if there was anything the matter with them. If so they were at once taken to a place to be dealt with as diseased animals. Pigs generally had a bath, there being a pond through which they were made to walk, so they arrived clean at the lairs in which they were to be kept. There were separate lairs for sheep, swine, horned cattle, and calves, there being a little space between the lairs and the abattoirs. These institutions were to be found in nearly every German town; those which have not yet provided themselves with

one being in the way of doing so. From his enquiries he quite understood that within ten years there will not be a German town, however small, without one of these public abattoirs, in fact, they could be seen growing up near every railway station. All the larger towns have already got them. The new abattoirs in Paris were being constructed on a similar plan, and, so far as possible, the system has been adopted in the new slaughter-houses at Birmingham, as well as at the Foreign Cattle Market at Deptford. The animals were kept in the lairs for a few days until wanted, they were all properly marked, so each butcher knew his own cattle. In the abattoirs every part was as clean as could possibly be managed, and so was everything in the vicinity; the buildings were quite as ornamental as our best hospitals, with a good deal of red brick and stone; they were no disfigurement to a locality in appearance, and nobody seemed to think there was anything objectionable in them. The approach to an abattoir was generally called "Slaughter-house Street," a convenient name, which enabled anyone to find the place that was wanted. The cattle were taken into the slaughter hall with a mask over their faces—blindfolded in fact—and a spike was fixed in the mask ready to be driven with a mallet into their skulls.* The slaughter hall was a spacious building, open from end to end, a passage running down the centre; on one side all the animals were slaughtered, and the carcases were hung up on the other side. When slaughtering was in progress the inspectors were walking up and down the central passage; there were special hooks upon which the slaughterman had to put the various parts of the viscera directly the animal was killed; there could be no mistakes or tricks. If the inspector was not satisfied, specimens of the meat were taken and examined; if satisfied, however, the meat was stamped in every part. If the butcher did not want the meat at once, it was run across to the cooling chambers, which were generally kept from three to five degrees above freezing point. The sides of beef were hung by an overhead rail on which the chains ran. There was every convenience for dealing with the meat without handling it; every butcher rented small cells of galvanized netting in the cooling chamber, so that no pilfering could go on. Various methods of blowing in cold air, or cooling pipes were adopted, so that meat could be kept for three weeks without the least difficulty. Ice was also made and supplied at reasonable prices. The meat was taken away to the shops in the butcher's covered vans and put in his ice chamber. The administration of the abattoir would be under a veterinary surgeon or a medical man, whose office and other buildings for the men were near to the entrance. In some large places like Leipsic or Frankfurt, a bourse or meat exchange would be added, a large business room, with ample provision for refreshments. In fact, in most of these places there was as good a refreshment room for business men as would be found

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* A plan of a somewhat similar slaughter-house at Munich is given in Vol. XIX, page 56.

in any provincial town. Then there was a place for the unsound animals, the very bad ones being rendered incapable of being used as food, but that meat which was only slightly diseased was sterilized. That portion which could be made safe to eat was sold very cheap, but it could only be bought in limited quantities of about ten lbs. There was great competition for this meat, which was generally bought by the poorer classes. Then there was a department for dealing with the offal, as well as the heads and skins. This would give them a general idea of the arrangements of a modern place of this kind; they seemed to be not only efficient but clean and not unsightly. The slaughter of animals under any conditions could not be called pleasant, but this method removed all the most objectionable features of the trade and annoyance to the public. He was not prepared to go into questions of cost that evening, but in Germany these institutions were self-supporting, and his estimates showed that, with moderate charges, they might be self-supporting here.

Mr. Redman (London) contended that though the Royal Commission had greatly strengthened the position taken up by the medical faculty, they had to a very large extent failed to prove how any great injury was to be done, or how any grave risk was run, by eating meat taken from a slightly or more or less tuberculous animal. If he were to ask Dr. Forman or any other scientist to give a single instance, or prove to demonstration that a man had acquired the disease from a tuberculous animal he was afraid they would come to a full stop. Their case was largely based on inference, and their deductions drawn from experiments made upon animals—animals of a very delicate nature; all of them most susceptible to this particular disease. When such animals were inoculated with a specially prepared emulsion, with the virulent bacilli carefully included, he admitted such food generally was fatal, but there was not yet any proof that when tuberculous meat was taken in the ordinary way through the alimentary canal the risk was as grave as they had been led to believe. In fact, some medical authorities had shown that under ordinary conditions the bacilli had passed through innocently enough. If, moreover, the infective matter were subjected to the temperature up to which man cooked his meat, the speaker challenged anyone to prove that under those circumstances the disease would be acquired. The Commission itself admitted that the risk the human being ran was greatly exaggerated. People did not eat meat raw, and he thought it rather unfair to suggest that there was any such great danger in this particular direction. Now, the consumption of meat had increased enormously in England, but, strange to say, the death-rate from tuberculous disease had fallen, and hence he thought they could fairly conclude the risk was small, and not so enormous as had been represented in the paper. Dr. Bond had admitted, in reply to a pertinent question, that the disease might be conveyed through the lungs as well as by meat and milk. The Commission itself had stated that the disease, notwithstanding its prevalence during the meat-eating age, was acquired, not through the intestines,

but through the respiratory organs. Then, too, this disease was most rife in the very young, by whom meat was not eaten; but as they reached the age of from 5 to 15, when meat could be assimilated, so the period when they were most immune from the disease appeared to be reached; and it was only at a subsequent age-period, from 15 to 45, that the nature of the disease changed entirely, and it was found not to be intestinal, but attacked the respiratory organs. Therefore, so far as the speaker could see, the consumption of meat had very little relation to the phthisis death-rate. They could not prove cause and effect as regarded them, and he thought they should look farther for the sources of tuberculous disease. How far did sanitation affect it? Let them take the case of Salisbury. That town was considered a dreadful place for consumption. The authorities proceeded to properly drain it, and in a little while the rate of consumption dropped 50 per cent. Take another case—that of a town in Sussex. There they overcame the dampness of the surface of the earth, and down went the rate of consumption. In these cases, he contended, they could see cause and effect at work. Then there was the question of overcrowding. Sir Richard Thorne had demonstrated that as the people lived in larger houses and had more air and sunlight, the lower was the rate of consumption. He contended that if they took 100 tuberculous cases, and studied the causes assigned by medical men, they would find that to every one out of that number assigned to meat—which one would not be capable of proof—there would be 99 cases the origin of which could be demonstrated. With regard to abattoirs, in Germany, with 35,000 inspectors, and such institutions established everywhere, they would naturally expect the inspection to be very complete. Well, notwithstanding that, if an examination were made into their death-rate, they would find that with one exception London surpassed them all in immunity from tuberculous mortality, and that exception was the case of a modern town. But if they were to rebuild London in the same way as the city in question had been largely rebuilt since 1870, then London would be equally immune. As it was, London showed in this particular respect a better result than all the towns which had spent large sums on abattoirs. These institutions could, of course, be made to show a satisfactory financial return as long as they were allowed to fix their own charges, and the butcher had to pay. Under such conditions as that, anything could be made to pay. As a trade, butchers welcomed all kinds of inspection, particularly in London, where they had a very high standard for meat—perhaps the highest standard that was to be found anywhere in the world. They did not mind more inspection, and if the public manifested any alarm, it might be well to have a few more inspectors. But they did not make any such manifestation; they did not feel they were being poisoned by the meat they ate, as they were taught to be by such alarmist lectures as the speaker's audience had listened to that evening. When the butchers of London went before the London County Council, they stated that if more inspection was thought to be necessary, they would be quite prepared to accept anything that

was reasonable, anything that was right; but that they were not prepared to accept a system of abattoirs until such a vast change was proved to be absolutely necessary, until it was shown that the public was being badly served, that the meat supplied them was disseminating disease, and that the public health was suffering. Finally, there was the ratepayers' side of the question which might also be taken up, but he would not go into that, because they were dealing with the subject that evening from a scientific aspect. If they had the most perfect system of public slaughter-houses possible, they would not prevent people doing a dishonest act where there was a desire and intention to be dishonest, any more than they could stop a thief stealing a pocket handkerchief by passing an Act of Parliament. Besides, meat in London was so cheap that it did not pay anyone to run the risk of selling a diseased article for the small extra profit that might be made. He thanked the meeting for the attention paid to his remarks.

Dr. HARRIS'S REASONS FOR ABATTOIRS.

Mr. Frederick Redman, whose remarks on Dr. Bond's paper are given on page 228, asks us to reproduce the attached letter (which appeared in the *Islington Gazette* of December 8th, 1898). The fear of occupying too fully the time of the meeting prevented Mr. Redman discussing in detail Dr Harris's "Reasons," but the letter here given is a reply to his contentions:—

Dr. Harris and Public Abattoirs.—Sir, The publication of Dr. Harris's report on the question of the suppression of private slaughter-houses and the establishment of public abattoirs, in your columus—bristling as that report is, not only with inaccuracies, but erroneous deductions, founded on unsubstantial bases—is so likely to prejudice the slaughtering butcher in the eyes of the public (as it has prejudiced his case in the eyes of the Islington Vestry), that I should be glad of a small space in which to comment upon it.

With regard to Dr. Harris's "Hygienic Reasons." He says "the erection of abattoirs would remove nuisances from the neighbourhood of dwelling-houses." I should first like Dr. Harris to show that slaughter-houses in Islington are a nuisance. When he has done so, I shall take leave to inform him that he has neglected his duty in not reporting the nuisances to the County Council, and getting the licenses suppressed if he has a good case. If he has not, he should hold his peace. I presume that Dr. Harris has read Dr. Shirley Murphy's report to the London County Council on this subject of abattoirs. I say I assume this much, because his report fails to show that he has dipped very deeply into the whole question. If he has read that report he must have noted that Dr. Murphy pays the very highest compliment possible to slaughtering butchers, not only as regards the way in which their slaughter-houses are kept, but also as regards the readiness they have always shown to conform to any regulations, even when they involve a great expense, which the London County Council has drawn up. Abattoirs, Dr. Harris further states, would protect meat from the liability of exposure to foul emanations. The requirements as to light, air, ventilation, &c., in our slaughter-houses are laid down by the London County Council, and an army of parochial and London County Council officials see that they are carried out. It should be apparent that if the business did temporarily cause "emanations," they would be intensified where wholesale slaughtering is carried on. Moreover, Dr. Harris can take it from the writer, who claims to be an expert on the subject, that universal experience shows meat keeps longer in a private slaughter-house than at Deptford or any other abattoir yet erected.

The doctor also says that abattoirs would ensure the inspection of all

meat for symptoms of disease. He is apparently not aware that 90 per cent. of the meat of London is already rigorously inspected in the markets, while there is the aforesaid army of inspectors in every parish to examine that killed in private slaughter-houses. The latter fact also answers his contention that abattoirs would limit the trade in diseased meat, if such trade exists. I do not know of it; do not believe that with meat so cheap it would pay any trade to habitually run the risk; and can assure Dr. Harris that the cattle which private slaughter-house owners kill is the pick of the English produce, is not the kind which provides the unsound meat occasionally seized or surrendered in the markets and their neighbourhood, and the establishment of abattoirs would therefore be unlikely to amplify such discoveries.

Dr. Harris's "Economic Reasons" for abattoirs are as faulty as his "Hygienic Reasons." His contention that the meat killed in abattoirs would be less liable to spoil, because killed under better conditions, is already partly answered in my statement (founded on many years' experience of hundreds of men) that such meat will not keep as well as that killed in the private slaughter-houses. As for the "better conditions"—the conditions under which an animal is killed affect the quality of the meat supplied. And the owner, who is on the spot, has a pecuniary interest in seeing that they are of the best. He will not be on the spot in an abattoir, and must leave the "conditions" to a large extent to men with no interest in the product of their work. Dr. Harris says "much blood and offal now lost would be entirely saved." The very reverse is the fact, for anyone acquainted with the subject is aware that offal sold direct from private slaughter-houses is a valuable food for the poor, is distributed in better condition, and is far more valuable than if it had to be conveyed from an abattoir to the vendor's establishment, and is therefore by no means lost. The doctor's contention that "abattoirs would effect a saving, from order, the proper division of labour, avoidance of driving animals through the streets, and the doing of business on a large scale," is most illogical. Slaughtering butchers now do their business on their own premises, and with a staff under their own eye. They are not to be compensated, according to Dr. Shirley Murphy, and they will not be able, in one case in fifty, to make a profitable use of their disestablished slaughter-houses. They lose all that, and what occurs? The public has to find at least a million of money to put up abattoirs, the butcher has to pay fees at the slaughter-house and keep a staff of men with horses and vehicles running to and from the abattoirs (which will be ordinarily three to six miles away), lairing cattle, killing beasts, storing the meat to "set," fetching it away when wanted, and doing other work. The places in which the work is done now are to be annihilated, and butchers and public alike are to pay heavily for the proposed new method.

Where is the economy? As to the statement that abattoirs yield a fair profit, I challenge Dr. Harris to produce the returns of all the public abattoirs in the kingdom, where the payment of interest and the repayment of principal is allowed for in the balance-sheet, and substantiate his statement. I am afraid the task would be beyond him.

Finally, the "Humanitarian Reasons." He says, the "cruelty to animals that now occurs would be put an end to, owing to the use of improved appliances for slaughtering." I merely again say that "cruelty" means depreciation of the quality of the meat, and self-interest and personal supervision now prevent it. Dr. Harris intimates that the cattle would not be driven through the streets, because the abattoirs would be near railway stations, and thus another form of cruelty avoided. As a matter of fact, cattle suffer vastly more when carried about in railway trucks than in travelling over roads, and the doctor's reasons are again the reverse of correct. Finally, he says, "the street dangers, through cattle being driven through the streets, would be greatly lessened." I should like him to give us all the recorded instances of accident through such cattle driving, and if he holds them to be an argument for the abolition of the slaughter-houses they are driven to, then I will find him arguments a hundred times as powerful, why railways, trams, buses, bicycles, and other things should be abolished.

Dr. Glover Lyons (London) congratulated the author on the perfect arrangement of his paper, and from personal knowledge bore testimony to the trouble he had taken in its preparation. The interest with which it had been received would have repaid Dr. Bond for his labours. So far as he could make out, he did not know that the last speaker had given them any reason why public abattoirs should not be provided. Did that gentleman object to them or not? (Mr. Redman: Certainly). Nothing Mr. Redmam had said had disproved anything said by Dr. Bond. However, he agreed that they should be careful not to exaggerate the danger, and on the other hand they should not try to depreciate it. The position they ought to take up was that there is a danger, and if it could be so easily got over in the manner suggested by Dr. Bond, then such precautions ought to be taken. An abattoir was exactly the place to stop the spread of tuberculosis. If the animal was inspected some time before it was killed, it might contract tuberculosis in the interim. If there was anything in the argument in favour of abattoirs, then they would in time be universally adopted without pressure. A dairy company had recently sent round a notice that all their milk was taken from fully inspected cows; there would be financial gain in that, and he could not help thinking butchers might adopt a similar step with profit. There was one point on which he had to criticize Dr. Bond's remarks. The matter was so much before the public that it was essential they should have correct information. Now, in reply to a question as to what is tuberculosis or what produces tuberculosis, Dr. Bond gave them correctly the "direct" cause of the production of tuberculosis, *i.e.*, the entrance into the body of the tubercle bacilli, and its growth there. Yes, but there was very much in the last words—and growth there. Now, that was very much forgotten at the present time, mainly because of the speech of a very eminent medical man, who had laid much stress upon infection in the causation of tuberculosis. He thought this gentleman's utterance had caused great mischief and injustice, and the sooner the public knew it was a great exaggeration the better. He spoke rather feelingly on this point because he happened to know of a case in which arrangements were completed for building a sanatorium, and at the last moment the ground landlord refused to grant a transfer of the land because he had heard that tuberculosis was infectious. At Ventnor many residents refused to walk past a consumptive hospital for the same reason. This was ridiculous to anyone who understood the matter, but although it seemed almost incredible, it was still a fact. There were three factors which produced consumption, which had to be considered if they wanted to get at the bottom of the matter; one was heredity, the second, mode of life habits, and the third, infection. Now, without trying to depreciate the importance of infection, he wished to point out that some people are born much more liable than others to consumption. There was no question at all about that. Such people living an ordinary civilised life, especially in a town, are pretty sure to get it. But the factor of habits was perhaps the most important of all,

at any rate, it was extremely important. Living indoors, in badly ventilated rooms, or insufficient bad food, and so on, reduced the vitality of a human being, so that from being unable to take consumption, they become a prey to it. They might just as well try to grow corn on the Sahara as to expect a healthy strong man, having no special hereditary susceptibility to consumption, in good habit of life, to catch the disease in an ordinary civilised community.

Mr. COGGAN (London) said that, after hearing the paper, he had come to the conclusion that the arguments his association had placed before the London County Council some months ago had been amply borne out by Dr. Bond's remarks. They had then clearly stated that the diseased emaciated animals did not come into the slaughter-houses, and therefore public abattoirs were not required. The author had stated that they had proof that a large quantity of diseased meat now came into London; if so, it did not come into the slaughter-houses; and if the authorities were aware of this they should put the law in force, not wrongly putting the blame on the slaughterer and the butchers of London. Enormous quantities of good sound meat could be purchased at ridiculously low prices and therefore it seemed absurd to argue that diseased meat should be sold at great risk and little profit. He thought the result of the evening's meeting was to prove that abattoirs were not required.

Mr. W. HUNTING (London) said he did not rise to contradict the last speaker, but to supplement what he had said. Unfortunately, he saw something of diseased cattle in London, and the worst case of tuberculosis he ever noted was killed in and distributed from a private slaughter-house in Chelsea. Now, there were a number of milk cows in London. Were they to believe that none of those animals were eaten by the people of London? Twenty per cent. of them were suffering from tuberculosis. What became of them? Private slaughter-houses utilised them mostly. But confining himself to the question of tuberculosis, was there no other way of protecting the consumer, if he ought to be protected, from this disease? Would it not be simpler to stamp out the disease amongst cattle? What is the special grievance the butcher has? That he, the temporary owner of cattle, is the only person punished by law—they were going to punish the milkman directly. At the present moment the butcher was the only man who was fined, and pretty well the only man the law proposed to touch for the protection of human beings against tuberculosis. Now, did they not think it would be fair to protect the human beings by paying compensation for the destruction of these carcases? Did they not think if they paid compensation with one hand and fined with the other they would have the very strongest method of preventing injury to human beings from tuberculous animals? If a man could get only half what he got from the butcher he would never send one into the market—never send one into a shop—he would never risk it. He was not at all surprised at the agitation of the butcher, but he was surprised at the farmer

paying no attention to this matter. The British public had made up its mind that tuberculosis was a dangerous disease. The farmer was the man who distributed to the butcher and cowkeeper tuberculous cattle, and the Board of Agriculture protects him. Nobody had yet proposed to touch the farmer, the man who cultivated the disease and kept it amongst his stock. He would like to tell the meeting why. The man who blocked the way was the pedigree owner—the rich men of this country, whose herds were saturated with tuberculosis; and until he had managed by the aid of tuberculin to get rid of it, and sell it to the butcher—who, of course, would be fined—nothing would be done. In a year or two the pedigree owner will have got rid of his diseased cattle through the butcher. We are all waiting for the agriculturist to do something; for the Royal Agricultural Society, as their mouthpiece, to ask the Board of Agriculture to make regulations and to give the farmers compensation, and then we shall gradually stamp out the disease.

Mr. J. Lemon (Southampton) said that some years ago he had occasion to design some abattoirs, but his authority did not see its way to carry out the scheme. No authority had statutory powers to force a butcher to go to the public slaughter-house, and therefore he thought something ought to be done to meet the objection of butchers to public slaughter-houses. One of their objections—and it had his sympathy—was as to the barbarous method of killing cattle in a large hall. At Liverpool he had seen cattle standing in a row waiting to be killed, and they were all trembling. He thought there was no reason why they should not have public slaughter-houses on the same principle as that adopted at Manchester, where they had a public slaughter-house which the butcher could enter and use as he could his own private slaughter-house, paying a rent for it. There was this advantage that it was open to inspection, but with the present private slaughter-houses the inspection was necessarily carried on with much difficulty. Of course, if all private slaughter-houses were built as well as are the public slaughter-houses, very little could be said against them, but as a matter of fact they were mostly stables or sheds, or other extemporised buildings to which a license is given. Little progress had been made in the matter during the last twenty years, and considering the incidental difficulties he thought they ought to meet the man who used them (the butcher) half-way, putting up a building which could be voluntarily used. In time the private slaughter-houses would disappear. Having studied the matter from the financial point of view also, he was sure that they could erect a good building and let it to the butcher at a rent which would not be more than he now pays.

Mr. Colam (Secretary to the Royal Society for the Prevention of Cruelty to Animals) referred to the question solely from the point of view of humanity to animals. He and his society entirely supported the view taken in the able paper which had just been read. He need not mention any horrors he had seen in slaughter-houses

throughout the country; he had been in many hundreds; some butchers were humane, some were careless, some cruel, very; there were good and bad persons in every trade. He agreed entirely as to the immense superiority of the slaughter-houses on the Continent. In answer to the gentleman who said that these places were places of great cruelty, he could say that he had watched the operations at Munich for hours and days in particular, and he had never seen a single act of cruelty, but in London he had seen very much cruelty, and the Society, during his term of office (about 40 years), had had to prosecute a great many persons for it. A private slaughter-house was private ground and they had no right of entry; in the case of a public slaughter-house this disadvantage would be removed.

In replying, Dr. Bond said he was much obliged by the attention given to the subject, and especially for the remarks of those who had opposed the scheme. In the paper he had tried to show how a great many of the objections could be obviated. Mr. Redman had complained that only susceptible animals were used for the purpose of experiment, and this was so because it was merely desired to show that tuberculosis could be transmitted by diseased meat; but it was also not to be forgotten that many human beings were also very susceptible animals, as had been shown by Dr. Lyon, who spoke of hereditary tendency, particularly when persons lived under insanitary conditions. But the experiments of Sims Woodhead and Dr. Sidney Martin convinced him more than ever that tuberculosis was produced in the human subject by the consumption of tuberculous meat and milk. Having referred in some detail to these experiments, Dr. Bond said there was no doubt that in susceptible persons small doses of tuberculous food would sometimes produce scrofulous glands or tuberculosis in remote parts of the body or in the lungs. This was particularly the case of young children, and there was ample proof that the disease could be transmitted by tuberculous milk: then why not also by tuberculous meat, which was also tuberculous food? He also reminded Mr. Redman that beef is very often eaten in a half-cooked or semi-raw state. With regard to the death-rate, it was not to be forgotten that the death-rate from tuberculosis in the case of young children under one year of age was actually increasing. In Salisbury and other places mentioned by Mr. Redman, in which improved sanitation had led to a diminished death-rate from consumption, better sanitary conditions would make anyone who might eat tuberculous meat less susceptible to the disease. In fact, a healthy man, living under good sanitary conditions, might eat a fair amount of tuberculous food with impunity. In Germany, it was well-known, they had not attained to such a high state of sanitation as in this country. He had quoted the actual charges for the use of public abattoirs.

Mr. Redman: No, that is only the toll.

Dr. Bond: No, it is for the whole animal. He had the actual figures which could be seen by anyone who liked to wait.

Dr. BOND, proceeding, said with regard to the quality of the meat, much that he had seen was far from the highest quality. There was no doubt that even in London the poor people were very badly served. He knew from trustworthy sources that in a great many parts of London there was a traffic in diseased meat.

Mr. REDMAN said he took exception to that until it could be proved.

Dr. BOND replied that he had been able to prove it in Holborn.

Mr. REDMAN: Not recently.

Dr. BOND: Not so much now, because there was more efficient inspection. They had seized meat which had come from London, from the slaughter-houses in Islington and Deptford. He quite agreed with the remarks of Dr. Lyon as to the desirability of properly appreciating the risk. What was wanted was to get at the facts of the case. Several persons who gave evidence before the Royal Commission on Tuberculosis stated that some butchers did advertise the fact that their meat was properly inspected. Mr. Hunting answered practically some of his objections when he said that wasting cows were sent to the London slaughter-houses. Many diseased emaciated cows are sent to the Islington slaughter-houses, as Mr. Shaw could tell them. They had to be killed somewhere. He sympathised with Mr. Hunting's view respecting the butcher, but he did not believe that the establishment of public abattoirs would injure the butcher; on the contrary he contended that the butcher, the stock owner, and the poor people who had to eat this horrible stuff would all gain. If the farmers made use of tuberculin, it had been proved that they could extirpate tuberculosis. If there was the proper meat inspection which he had suggested, he believed it would help in that direction, because they would not be able to dispose of their diseased animals, and further they would eventually be the gainers, because, after ridding their herds of tubeculosis, they would not have the losses. With regard to meeting half-way the owners of private slaughter-houses, of course, he agreed that that should be the case, either by compensation or lower charges, as was done in Glasgow.

Mr. REDMAN, in proposing a hearty vote of thanks to Dr. Forman for presiding, said they were cognizant of the impartiality of the Chairman when they had gone before him at the London County Council, and they believed that he was actuated by motives of public interest in his work.

Mr. COGGAN seconded the motion, which was formally supported also by Mr. A. L. LEON, London County Council, and agreed to with acclamation.

Dr. FORMAN, in acknowledgment, thanked Mr. Redman for the kind way in which he had spoken, and said he had been very pleased to see that the representatives of the trade had attended and taken

part in the discussion. They had very well defended their side. Mr. Redman had made the most of his facts, but they could not get away from the one fact that tuberculosis is spread just at that one age when the individual does not eat meat, and is lessening at the rate of 30 per cent., so that, as Sir Richard Thorne said, in thirty years it ought to be exterminated altogether. Mr. Redman in his clever speech referred to the case of Salisbury, and recognised that there were other factors in regard to the prevention of tuberculosis, but when he went to the continent he seemed to think that because the establishment of public abattoirs had not lessened the death-rate from tuberculosis, that that was a proof that tuberculosis was not caused through eating meat. The argument could not be used both ways. The abolition of private slaughter-houses had lessened the death-rate from tuberculosis, but what was gained was more than lost from other causes. The cities on the continent could not compare with our English cities in the matter of sanitation. He could not help thinking that the solution of the whole problem was to compensate the trade for what was taken away from them. The butcher could not deny that if we had better inspection of meat it would be for the good of the butcher, the stock owner and the consumer, and no harm could come from that. He had to admit that ever since he had been connected with the Council they had been screwing up the poor butcher, putting him to great expense in improving his slaughter-house—in one case he knew a gentleman had spent £2,000 on his establishment—and therefore they could not take away a valuable property. There were cases in which they ought to compensate. Then he thought the Government should take the matter up, but they had said they were not prepared to introduce legislation on the subject at all. If the reform were carried out it should not be permissive but compulsory, and it should be universal with regard to the tuberculin test, which was now said to be successful in 99 per cent., this should not be administered by the farmer, it should be done by the slaughterman. That, he believed, was Professor McFadden's latest conclusion. He knew of a case at one of the Council's asylums in which a cow, passed by Mr. Haydon from general appearance as perfectly good, was killed and found to be entirely affected with tuberculosis. Now a public abattoir would ensure perfect inspection, and although diseased meat might be improperly introduced into London, the butcher could not get the joints stamped. In concluding, Dr. Forman said, more education and information was required on the whole subject, and he was sure the results of lectures and discussions, such as they had had that evening, must be good, leading in time to the appointment of an adequate staff of inspectors. For the present the report of the Committee at the County Council had been withdrawn.

PRACTICAL HYGIENE TEACHING IN ELEMENTARY SCHOOLS.

By Miss RAVENHILL.

(Associate.)

Read at Sessional Meeting April 12th, 1899.

The outcome of enquiries recently made as to the present position assigned to the teaching of Sanitation in any form in Elementary Schools showed that not more than about one per cent. of the five and a half million children, whose names appear on the school registers, receive instruction in any branch of this subject, whether it be included under the head of Domestic Economy or approached as the advanced "specific" subject of Hygiene. The experience, gained by visits to Board Schools in many parts of England, affords evidence also of the unsatisfactory character of much of this teaching even when given. Such a position cannot but be regretted by those desirous of seeing Sir John Simon's ideal education a fact in our midst; viz: "that education which by model and example would lead the poorer classes of society to know cleanliness from dirt, decency from grossness, human propriety from brutish self-abandonment; . . . . an education which would teach them to feel the comfort and profit of sanitary observances, and would apply their instincts of self-preservation to the deliberate avoidance of disease."

Many of those directly connected with Elementary Education are apparently considerably prejudiced in favour of existing conditions, though it seems possible to demonstrate a weak link in each chain of argument with which they support their views.

1. *The laudable and increasing desire to co-educate the sexes with the view of starting them fairly in life.* Domestic Economy, which covers some of the desired ground, is at present limited to girls in and above Standard IV., and members of School Boards, School Managers, equally with teachers, favour the

hoice of unrestricted "class" subjects, (such as history and geography,) in order that boys and girls may be subjected to n identical mental training. Surely by adopting a somewhat ifferent treatment, wider, yet simpler, of many of the points ow included under the term "Domestic Economy," a course of essons on Elementary Hygiene could be evolved, suitable for ither sex, and capable of being advantageously included in the ime-table of Mixed or Separate schools; thus removing this bjection.

2. *The tendency to under-rate the dignity and value of domestic luties, and failure to appreciate the far-reaching importance of heir intelligent performance, or to recognise the intimate connection between healthy family life and sound national prosperity.* This tendency should shortly disappear as the public mind slowly arouses to the duties and obligations of citizenship, and also grasps the economic value of widespread preventive knowledge in health matters. The interest, use, and influence of the subject, too, has been disguised by unnecessary limitations to its directly personal aspect; whereas young people ought to be gradually led on to realise and apply its principles in their important civic relations, being thus prepared eventually to recognise imperial responsibilities for the well-being of Greater Britain.

3. *The opinion that instruction in the laws of health savours of early "specialisation," and is better reserved for study later on in life.* This opens up the question as to whether the principles of a subject which should guide the whole conduct of life can be so described, or could be instilled at too early an age. "As the twig is bent the tree inclines." The evils against which the teaching of such rudimentary sanitation would be directed are among "the deepliest rooted habits of the country;" and it is to the *early* excited intolerance of insanitary customs we must look for the rejection of stupid, ignorant prejudice, or for the justification of Local self-government in Health matters. The reports of Evening Continuation Schools, Technical Education Boards, etc., confirm the assertion that, unless interest be aroused in childhood, the chance of the subject being studied in later life has, so far, been remote. The comparatively meagre results perceptible also after many years' hard honest work among adults by Hygiene lecturers under the various County Councils, or Health Associations, are evidence of the serious obstacles to be overcome if life-long habits are to be changed, or even modified.

4. *Lack of interest on the part of the teachers, so that the subject is not invested with its truly attractive attributes.* A consequence arising either from (a) the practical omission of

Sanitary Science from the Training College curriculum. (*b*) The strain of studies so exacting that little time, and less thought, can be spared for domestic duties, and the regulation of health; "habit, if not necessity, having accustomed them to things non-hygienic," so that a low standard of health is passively accepted as the necessary accompaniment of intellectual life. (*c*) The circumstance that many teachers are of an age when life's experience has still to be bought, and a fictitious value is apt to be placed upon more showy attainments. (*d*) The fact that the power of teaching many subjects with equal ability and zeal is possessed only by the few; while practical hygiene pre-eminently demands that its truths shall be impressed by the force of strong individual conviction. (*e*) The plea that time would not permit of giving really practical lessons; for instance, it is possible—say they—to teach a child in a few minutes to repeat glibly the verbal definition of a "trap," but the claims of more important "grant-earning" subjects forbid devoting the time essential to a practical demonstration upon a gulley trap in the school yard.

These objections to a more general introduction of the subject for which I am pleading are serious and significant. Until the zeal of the teachers is awakened, the interest of their pupils will not be aroused. Would it be feasible to institute courses of lectures in the Training Colleges specially directed towards exciting this dormant interest? The wide practical scope of the subject would have to be emphasised; also its value and bearing in every relation of life; and the increased power to imbibe and apply general information which results from a practice of its tenets. A lecturer animated by absolute conviction, in addition to other qualifications, would be of course indispensable.

5. Again there is *the fear of adding a tittle to the existing burdens either of teachers or taught;* (in truth, a popular argument; for harassed teachers and bewildered, overwrought children are as a nightmare to the community), together with the conviction that the youth of the scholars and the limited time available render quite impossible adequate treatment of so extensive a subject as hygiene, which to be of practical worth, these objectors say, should be grounded on a thoroughly scientific basis.

I am thankful to have the support of several sanitarians and teachers in my belief that the elements of Practical Hygiene, wisely and suitably taught, would have the contrary effect from that so dreaded; that half an hour devoted to this study once or twice a week would prove to be of a recreative rather than of an exhaustive character.

If the subject be entirely confined to Standard IV. and upwards as at present, about one-sixth of the scholars never even have a chance of being introduced to it; and, so long as it remains "optional," the proportion is much larger.

For these reasons it is my earnest hope that weighty influence may be brought to bear to ensure deliberate and careful consideration being given to the strong claims of Elementary Hygiene to be constituted an "obligatory" subject. Many more arguments might be added, though to detail them to this audience would be superfluous; they are self-evident to all those aware of the vast amount of wasted life, health, and energy which raises our poor-rates, fills our hospitals, and exercises its prejudicial influence on our national wealth and prosperity. It is to education we must look to bring home to the people that it rests mainly with themselves to work out their own salvation from sickness, poverty and sorrow, by letting the light and air of hygiene into the dark places of ignorance, apathy, and prejudice. Can such education begin too early in life? The instruction is of equal importance to both sexes, and throughout the country; many miserable hovels in so-called healthy country villages are a match as regards overcrowding and dirt, want of thrift and dense ignorance, wasted food and sickly occupants, for any city slum; and it is against the condonement of these and other evils the rising generation must be armed, if our great population is to have a fair chance in the race for prosperity.

Almost as essential is it to reach and influence those somewhat higher in the social scale, from whose ranks are recruited the millions of the middle-classes; it is unnecessary to speak in detail of the ill-ventilated rooms, want of attention to delicate personal cleanliness, sacrifice of comfort to appearance, and the ignorance visible in the choice, care, and cooking of food, which characterise many fairly well-to-do homes, and steadily undermine the health of their inhabitants; especially as, on this occasion, I must confine myself to the needs and claims of the children in our Primary Schools.

Possibly it is still too soon to expect perceptible results in home life from the very small number of elementary school children who have studied Hygiene as a "specific" subject; but there are those who question in what percentage of cases their intelligence is sufficiently developed to apply the general principles of such knowledge to individual homely facts, or whether undue importance may not be attached by the immature minds to the elaborate laboratory environment of experimental apparatus, so that the ultimate object of domestic application be raised out of the plane of practical politics. Be

this as it may, and whatever the national advantages which may eventually accrue, such advanced teaching is scarcely likely to become general; meanwhile no one can dispute that great public benefit must result from furnishing *each* child with a limited, but sound, equipment of sanitary knowledge. To secure such equipment, however, its provision must not depend upon the whims of Boards or tastes of teachers; it must be esteemed of equal importance with reading or writing, and even more pains taken to ensure its right and intelligent treatment.

Given the realisation of an ideal, and the subject in suitable guise, constituted "obligatory," several teachers of long experience have kindly pointed out to me the facilities which exist for its introduction without upsetting present arrangements; the Leicester School Board has for eight years, shown this possibility; 8,000 girls annually devoting to the study of Domestic Economy the time previously given to parsing and analysis; the teachers being inspired by Mr. Major's (Inspector, Leicester School Board) zeal, and guided by his text-books; indeed, believing as he does, that boys as well as girls could profitably learn the principles of hygiene, he has also compounded a syllabus of the Elementary Science (boys) and Domestic Economy (girls) courses for the use of both sexes conjointly, which is employed in some of the Leicester schools.

The code requires thirty object lessons to be given each year in Standards I., II., III. Some of these might compulsorily be devoted to this all-important subject; better still were facilities given for going over the same ground twice in the year, so impressing the valuable facts by recapitulation, even at the cost of a few more hours. It has been suggested that in the upper Standards the course might easily be introduced as subjects for the weekly composition; the teachers could thereby guage impressions received, note the relative importance attached to the different points by their pupils, and, possibly, detect their own shortcomings. A system of repetition in these Standards also would be most desirable. Some teachers favour the idea of breaking ground with a Preparatory Reader, to be followed up a few weeks later by a short recapitulatory lecture, furnishing material for the required composition; I would prefer a practical demonstration, however short, to the theoretical preaching of the very best "Readers." It would not seem unreasonable to ask for one lesson a week throughout the School year; but, I believe, to secure this boon for the children, it must be constituted a "grant-earning" subject. In any case, I attach great consequence to the teaching being obligatory for say ten years from now. A grounding in this subject of Elementary Hygiene would during that period be secured

to a whole generation, and if the foundations be well and truly laid, these children should not only be alive to the advantages of building their own lives upon them, but conscious, too, of their responsibilities towards others, so that, when in their turn parents, they would instil and practice at home information and methods which owing to prevalent ignorance must now be learnt at school. Perchance, too, the claims of this simple instruction in Hygiene would by the end of a decade be so widely appreciated and recognised that in spite of being no longer an "obligatory" subject it would never again be crowded out of Time-tables.

The simple lessons should treat of domestic subjects and associations familiar to the children, illustrated by facts and objects drawn from family life; and opportunities should be given for volunteering those scraps of personal information, or that comparison of experiences so dear to the childish heart. The conversational method is much to be commended in this connection, and relieves the tension of sustained attention which frequently interferes with the enjoyment of the most attractive subject. No additional demand need be made upon the teacher's acquirements; the instruction should deal almost entirely, and most simply, with the details of daily life, with which all adults ought to be familiar; taking first the "Home" as the centre of sympathy and shelter; then dwelling on the care essential to its right keeping, pointing out the intimate connection between this and the family well-being; so leading gradually on to the wider outlook and increased responsibilities of the intelligent citizen, concerned in all that works for the good or ill of his fellows. Homeliness of treatment, avoidance of technical and scientific terms, practical illustrations from actual objects or models, thorough "grinding in" of the absolute essentials to health (the details being varied to suit the children's needs), these should be the Keynotes; boys equally with girls sharing the advantages of such training. Believing that a young child's mind deals with concrete and isolated facts rather than with abstractions and the relation of facts, I hold that teaching on the above lines could be most profitably given from Standard I. upwards; remembering that these "commonplaces are new truths to the young, and if wisely handled, form admirable foundations on which character can be built." Many instances have also been furnished me by Mrs. Buckton and others of the good influence exercised in homes by little children taking back Health hints learnt at school to their mothers, and awakening not only their parents' interest, but leading to the inauguration of improved methods of household management.

Possibly the teaching of Domestic Economy is at present confined to girls because the early training of children, as well as the care of the home, comes within a woman's province (though, of course, Hygiene as a "specific" subject is available for both sexes, if they remain sufficiently long in a school where it happens to be selected for advanced pupils). Unfortunately, the training of her children by the lower class woman leaves much to be desired, and would bear with advantage to be supplemented, and intelligently supported, by her husband. Certainly the experience gained from a somewhat wide acquaintance with the homes of farmers, artizans, labourers, and mechanics, throughout England has abundantly demonstrated that the advantages of personal cleanliness, suitable clothing, varied diet, decent habits, and self-restraint need equally careful inculcation on both sexes. The women of a household have a poor chance of success in their ceaseless warfare against dirt and disease when hindered, discouraged, or worse, by the often slovenly or disgusting habits of its male members. The husband frequently plays a more prominent part in the domestic regulation of a working-class home than is the case among higher social grades, and the wife is more dependent on his goodwill to forward her plans for increasing cleanliness and comfort than in larger establishments. For example, the filthy habit of expectoration appears to depend upon more than the remonstrances of women for its discontinuance; perhaps better results would follow the arguments of a respected teacher, who could impress upon his pupils that this defilement of pavement, public conveyances, and rooms is not the hall-mark of manhood. Again, it is only necessary to read the reports of some of our Medical Officers of Health to learn the number of cases in which the chief obstacle in removing an infected child to an Isolation Hospital arises from the ignorant prejudices of the father; and the paternal parent is often as great a sinner as the maternal in foolishly feeding infants on any dainty which may offer, most young parents slowly acquiring some knowledge of the Hygiene of childhood by experimental practice on the health and characters of their families, and observing the effects on the survivors. The connection between dirt-sodden yards and such diseases as typhoid fever and diarrhœa receives ever-increasing substantiation, as does the high phthisis case-rate in foul, ill-ventilated rooms; unity of opinion, and the active co-operation of both men and women, are indispensable if these evils are to be abated by intelligent popular support, and observance of necessary restrictive measures.

Personal experience has taught me that, given the

opportunity, many working men not only possess a ready mind to learn about these things, but that they are frequently more alert to the value of immediate application than is the average woman; which strengthens my conviction that the progress of sanitary reform will be more rapid when such information on these and kindred matters as can be given during the short years of school life shall be extended impartially to the sexes; that the good intentions of well-meaning housewives will have a better chance of support when the necessary knowledge is a mutual possession; and that not till then will the national loss from preventible illness, and the high rate of infantile mortality cease to be a blot on the nation's honour.

Yet one more, and most cogent argument in support of extending this simple teaching to both boys and girls, viz.. the very serious responsibility conferred upon practically the whole community by the recent Local Government Acts. It is sufficiently serious that Imperial politics are allowed to submerge, in the bulk of cases, the contingencies in the balance in Local Government Elections, but additional anxiety is excited in thoughtful minds, when it is realised that an appreciable number of those who serve on the various Councils are virtually ignorant of the matters entrusted for administration to their discretionary powers. To deficient interest in the issues at stake may be attributed, also, the fact that the best and most suitable men and women are not always forthcoming as candidates; nor supported in their claims, when aroused to their duties in this respect. Surely, in this connection alone, even a bird's-eye view of the subject of sanitation would have its advantages; if, to quote Mr. A. J. Balfour, "the small amount of knowledge be learned thoroughly."

Of course, the amount of Hygiene acquired by such teaching as is suggested could only suffice as an introduction to the subject of Sanitary Science, but if the right method of instilling these elementary truths were adopted it should excite that spirit of enquiry which Prof. Michael Foster says, is one aim of teaching, and opens minds to intelligent conviction, so that their future actions are insensibly influenced for good. If the child be but trained to attach due importance to the Laws of Health, though his knowledge of detail and cause be limited, he will nevertheless be prepared to estimate at their right valuation in later life the further developments of the science of Hygiene, upon which he may have to form a judgment affecting the lives of thousands for good or ill.

It is my privilege to be engaged, with the approval of the Council of this Institute, in the preparation of a scheme of

instruction in Elementary Hygiene embodying the, to my mind, absolute essentials in an education which aims both at qualifying individuals for every day work and training them into complete citizens. Time only permits me to submit the outline to you this evening, though I would like to say that notes of each lesson, showing method, illustrations, &c., have been submitted to, and the ideas kindly approved by, Professors of Hygiene and Chemistry, Medical Officers of Health, school teachers of experience, and others interested in educational matters.

Briefly, the Home is taken as the axis around which both family and civic life revolve, and starting in Standard I. with the idea of this Home as the cosy shelter for warmth, rest, and happiness, attention is directed year by year to the essentials of a healthy, happy house; its necessary comforts and conveniences, such as light, air, space, cleanliness, its aspect, surroundings, rent, repairs, fittings, &c., a slight outline of the protection afforded to all by our Public Health laws being given in Standards VI. and VII. Dirt Dangers in the person, home, and community are selected for Subject II., Cleanliness and Comfort for Subject III., Air, Food, and Water follow on, supplemented by some teaching on the respective values and importance of judicious Rest, Work, and Play. The series being concluded by Lessons on the Care of the Person, Preservation of Health, and the Health of the Community, thus the subjects run as in the Table at pp. 248 & 249—(a Specimen Lesson is also appended, pp. 250 & 251).

Each of the ten points is gradually developed through the Standards, the parts being dovetailed into a fairly complete whole, the treatment and illustrations being bright, familiar, and I trust lucid, hard words and scientific terms being studiously avoided, and each lesson intended to be freely illustrated by homely facts as well as, almost invariably, by models, objects, and pictures, diagrams but rarely. I would suggest that the models and pictures be displayed only during the lesson to which they refer. Familiarity of eye rapidly breeds contempt, or, more exactly, the familiar objects cease to impress the brain. Most strongly I advocate the use in every possible case of school fittings and appliances as illustrations. In most instances natural ventilation, room cleaning, the care of sanitary conveniences and sinks, cleanliness of person and surroundings can be vividly impressed on the children's memories by school properties. I have endeavoured carefully to avoid in my illustrations objects unknown to an ordinary child, I mean in domestic life, though some latitude

must be allowed for the different environments of town and country children.

It is my earnest hope that this method of instilling the laws of health will not be condemned as "withdrawing children from that general teaching upon which the success of all higher technical training must ultimately depend," "or as concentrating their attention upon special subjects" which they are too young to understand or to put to any practical use. Too few people give a thought to the pitiably low standard of health among wage-earners, or, as Professor Marshall emphasises, how seriously the difficulties of raising it are increased by the ignorance and deep-rooted prejudices prevalent among those whose conditions of existence need no such additional handicaps to hamper their struggle for a livelihood. The children of our industrial classes are early familiar with these difficulties and inoculated with these prejudices. From infancy they are face to face with practical domestic details, which do not come before those in a higher social position till many years later. It is, therefore, for them this teaching is intended and is so infinitely to be desired; indeed, I rely to a certain degree for its success upon the familiarity of the pupils with some aspects of the subject brought before them, and venture to anticipate good results from the interest aroused by a recognition of home perplexities and suggestions for their removal.

"Teaching of this kind ought to, and will," wrote Charles Kingsley, "be held a necessary element in the school course of every child, just as necessary as reading, writing and arithmetic; for it is after all the most necessary branch of that 'technical education' of which we hear so much just now, namely, the technic, or art, of keeping oneself alive and well."

Necessarily the value of the treatment in detail must depend mainly upon the zeal and conscientiousness of the teacher; and a free hand and full scope should be allowed for application to local conditions. On this point I lay great stress; no text-book could possibly provide for every contingency; the notes of lessons can be only suggestive. All health lecturers well know the paramount necessity of acquainting themselves with local conditions, such as class of house, type of window and sanitary convenience, method of refuse disposal, source of water supply, prevalence of disease, and so forth; and to this knowledge of their audience's circumstances, and to the consequent possibility of proposing feasible applications of their teaching, is attributable the interest aroused at the time, and the encouragement which they obtain from results. So, in our Elementary Schools, certain broad principles can be laid

[*Continued on page 252.*

STANDARD I.	II.	III.
1.—*The Home.* Cosy Shelter. Ex.: from Birds and Animals. Rest, Warmth, Happiness, Durability and Suitability.	Materials used to build and decorate houses. What necessary to make healthy happy homes.	Comforts and Con in a home: A Space, Warmth ness, etc.
2.—*Dirt Dangers.* What things make Dirt unpleasant to breathe, eat, drink. Some effects of Dirt.	How Dirt invades homes; what it does. How this enemy can be defeated.	A common form Danger: Dustb to put in; how
3.—*Cleanliness and Comfort.* How Homes are kept clean and comfortable. Difficulties and Delights.	When to clean our home. What and how often to clean. The Power of Good Habits.	Clean habits for Girls. How bed, dust a roo yard.
4.—*Air.* What does air do. How know it is necessary to life. What makes air clean or dirty.	Air Starvation. What can be done. What does it cost.	Air starvation. the sufferers? feed them. G Open Spaces.
5.—*Food.* Need for food. Common to Man and Animals. Cooking and variety of foods. What Food does for the body.	Many kinds of food: man enjoys animal, vegetable and mineral foods. Foods for different ages; milk for babies, etc.	Flesh Foods, H Work Foods Foods.
6.—*Water.* Where water comes from. its uses. Why essential to life. Why care is necessary.	Some causes which make water unwholesome.	Hard water and s boilers burst a are furred.
7.—*Work, Rest, and Play.* How time is spent. *Cf.* World of Nature. Pride in work. Joy in rest, etc.	Work trains mind and body. Play trains body and mind. Rest builds up both minds and bodies.	Different method rest and play and country.
8.—*Care of the Person.* Helplessness of Babies. *Cf.* with insects, animals, &c. Babies' bodies casket for precious treasure, the brain, to be carefully guarded.	Laws of Health, Cleanliness, Good food, Pure air and water. Suitable clothing and exercise and rest.	Good habits. Wh care of the s ears and teeth.
9.—*Preservation of Health.* Valuable treasure health. How to guard and preserve it. *Cf.* to Traveller on journey.	Much illness around. Mother Nature's Orders. Mother Nature's Punishments.	Captain Cleanlin Regiment Habits.
10.—*Health of the Community.* The Health Army: Weapons, Recruits, Barracks, etc.	Mother's care for children's health. Who takes care of grown-up people. Health Rules for Towns and Villages.	Five Laws of I Towns & Villag liness, Wholes Pure Air an Healthy cond Work, recreati

IV.	V.	VI. & VII.
Choice of a home: Aspect, Soil, Surroundings, Comforts, Rents, Repairs.	Essentials to a healthy home: Dry, Airy, Clean, Space for Family, Good Water Supply.	How the Law helps to Healthy Homes. Some Provisions of the Public Health Acts: Nuisances and their removal.
Dirt Dangers from drains and privies. Outline System of house drainage.	Dirty habits and their dangers: Slop water, Expectoration (Phthisis), Accumulation of rubbish.	Dirt Dangers in and around a house; inside, outside. Remedies. Refuse Disposal in Town & Country.
Some suggestions for boys and girls on Home cleaning. Attractions of a well-ordered home.	Receipts for making homes clean and comfortable: Lime-washing, Floor-polishing. Decoration, Food Safe, Window boxes, etc.	Cleanliness and Sanitation. The lessons of Experience. Power of the individual.
Simple methods of Room Ventilation: Inlets, Outlets, Hincke's Bird Board, etc.	Simple methods of Ventilation for Rooms. Various appliances.	Air Pollution in Town and Country. The Purification of Air; window boxes and indoor plants; Open spaces, etc. Natural and Mechanical Ventilation.
Meals. What food we want; when and how we want it. Regularity, Variety, etc. When and what to drink.	How to choose food: how to store it. How to keep meat, etc. Milk: its Value and Dangers.	Risks to Food: Inspection, Adulteration, Preservation, etc. Legal Protection of Food Stuffs.
Water, and some common pollutions.	Water, and how to protect its consumers from possible danger.	The Water Supply: Sources, Provision, Protection, Amount.
Considerations on the choice of Life's Work. Dignity of honest labour.	Work and Overwork. Recreation and Self-indulgence. Necessary Rest and Laziness.	National importance of securing wholesome conditions of Labour and wholesome conditions of Recreation. How Work should be carried on, and Workers protected.
Healthy clothing for boys, girls and babies.	How wholesome diet helps health. Drinks and Drinking.	A Health Standard: how to attain it.
Farmer Dirt and his labourers, or Infection and some infectious diseases.	Infectious Diseases and their prevention.	*Girls.* Care of Babies. *Boys.* Moderation, Thrift, Temperance.
How to prevent the spread of infection in towns and villages: Notification, Isolation, Disinfection.	Requirements for Public Health. Reasons why so often neglected. Suggested remedies.	Machinery for securing Public Health. Local Governing Bodies and their Responsibilities.

SUBJECT IX. THE PRESERVATION OF HEALTH.
STANDARD I.

Illustrations.—Purse, some money. Pictures of railway station, bank, pet animals. Mended toy. Jug or cup very full of water. Money box. Leather bag.

MATTER.

I. Introduction.

To illustrate care bestowed on what is recognised as necessary to success in life (Money) and care lavished upon anything which adds to the pleasure of life—*e.g.*, on pets—to make them happy and comfortable.

METHOD.

I. Traveller starts on journey. Ask class to name the most important thing he takes with him. (Money.)

Lead the children to say what this money is used for: traveller's position if it were lost; his consequent care of it; purse put safely in pocket or locked in bag.

Speak of disappointment, upset plans, loss of pleasure, perhaps loss of employment, which would follow on loss of this money.

Enquire if the money could be lost in any other way than by theft or carelessness: frittered away uselessly before the journey is scarcely begun on smart clothes; eating and drinking; useless things such as sweets, comic papers, etc.

Lead children to enumerate three ways in which traveller may interfere with object of his journey by losing his money; (*a*) by want of reasonable care, (*b*) theft, (*c*) extravagance.

How lost money may be recovered; cost of advertisements.

Ask if any of class keep pets—cats, dogs, rabbits, birds; enquire what is necessary to happiness and well-being of these pets.

Care. They must be fed, kept clean and warm, have constant attention. Enquire effect on pet of neglect. (Suffering, perhaps death.)

MATTER.

II. Health compared to Treasure.

Cf. Enjoyment of good health with possession of money.

Cf. Means by which both health and money are lost.

Cf. Disappointment of traveller, whose money is lost, stolen or frittered away with a life deprived of health.

METHOD.

II. Tell class of a precious treasure possessed by each baby born, worth more than gold or silver, *i.e.*, health.

Draw from children the happiness, success and power for good which follow on enjoyment of good health. Poorly people are peevish; sick people cannot work; ailing people too weak, tired, etc. to help others around them.

Cf. with strong, healthy father, elder brother, etc.

How may travellers lose their money? By

(1) *Carelessness.* Illustrate loss of health treasure by carelessness—sitting with wet feet, not keeping body clean, etc.

(2) *Theft.* Some thieves which steal good health: bad air, unwholesome food, illnesses such as diarrhœa, measles, etc.

(3) *Extravagance.* Spending store of health in bad habits: eating unwholesome things, living in ill-aired, dirty rooms; if boys, smoking when very young.

III. Necessary Care of Health.

Cf. Care of money and care of pets. Emphasise needs of living things. Dwell on superiority of health over money; therefore it is worth the greater care necessary to keep it safely.

III. Ask what is done with money to keep it safely: hidden in pocket, locked in bag or box, stored in bank.

Lead children to point out difference between this kind of care and that they bestow on pets, or that needed by little boys and girls to keep their treasure, health.

Cf. Wooden box, leather bag, iron safe where money is stored, } with { Living bodies in which health is stored and their need of food, warmth, cleanliness, etc.

IV. How to guard and preserve health.

Use illustrations familiar to class, bringing out the desired safeguards: obedience to laws of health; reasonable care; vigorous defence.

Conclude with comparison of loss of money and loss of health; cost of recovery, risks, etc.

IV. Draw from class line of action when child is working to gain a prize.

A. Strict obedience to rules. Perseverance, sometimes self-denial.

Ask how child walks when carrying dish of baked meat, or jug of milk.

B. Carefully, not to spill gravy or other liquid.

Enquire what a man would do if attacked by thieves when in charge of valuable goods.

C. Fight to defend them.

Lead class to apply A, B and C to care of health, and impress that by obedience to simple rules, perseverance, efforts not to be careless or foolish, and learning by degrees how to fight against bad habits and diseases, this treasure can be kept securely all through life.

Show a toy which has been broken and mended; ask children to say why it is not as good as new. (Looks changed, shabby, perhaps imperfect, lost its bright, smart appearance.)

Cf. with sick person: have to spend money on mending both toy and invalid. Perhaps toy been broken through carelessness. Much better to learn how to take care, then the toy will last a long time.

Mother and teacher show children how to take care of health as well as toys, so that they may enjoy it all their lives.

[illegible] based on local

SUBJ[illegible] [illegible], to speak at [illegible] rural district, [illegible] of burying house

Illustration [illegible]

station, ban[illegible] [illegible] to the features full of wat[illegible] [illegible] any system adopted [illegible] Hygiene where school [illegible] yet the subject [illegible] influence on the future

MA[illegible]

I. Int[illegible]

To illustr[illegible] on what is [illegible] sary to ens[illegible] and care [illegible] thing which [illegible] sure of life [illegible] make them [illegible] fortable.

[illegible] absolute essentials be [illegible] stippled in later on [illegible] to be confused by a [illegible] into right perspective, [illegible] even to dwarf the [illegible] previously well indicated by

[illegible] *essential principles.* The [illegible] shelter, to which the [illegible] limited, to the wide [illegible] of the citizen; a per- [illegible] on the horizon of all [illegible] stimulate their desire for a [illegible] they have been trained [illegible] welfare of the community.

[illegible] *and practice of Hygiene* [illegible] *both sexes; and capable of* [illegible] *schools;* opportunities being [illegible] the health aspects of [illegible] Self-restraint, and Duty [illegible] factors in the attainment [illegible] Health, which it is the object [illegible] and maintain.

II. [illegible]

[illegible] remarked that the subject was [illegible] with very great pleasure indeed to [illegible] full of thought and valuable matter [illegible] be engaged in the work of [illegible] by speaking of how very little [illegible] in the elementary schools of this [illegible] but he believed it was a [illegible]. This was a new subject, just [illegible] the tip of its toe in at the door; it

would keep the door open, and gradually get its whole body into the school later on. As to the statistics, he had made some enquiries about the matter, and he found as far as the London School Board was concerned that for the year ending last Lady Day—quite recently—this subject of hygiene had been taught in three boys' departments and in one girls' department; domestic science had been taught in four departments. But then domestic economy had been taught in 163 departments, and he did not see why there should not be as many departments with domestic science and hygiene being taught as domestic economy. The fact was very evident in looking at these figures that there was only a small proportion of children in the London Board Schools who, as yet, were being taught any of these important laws of health. There were, of course, some who were being taught under the Science and Art Department and in the Evening Continuation Schools. There was one other way, however, in which the matter was being introduced, and he hoped it would be much more fully developed. A Joint Committee of the London School Board, City and Guilds' Institute, and Drapers' Company, for manual instruction, had existed for some years. It had finished its work as far as Carpentry was concerned, for that matter was being fully taken up by the Education Department; there was also laundry work; and lately there had been a scheme drawn out for girls, comprising cookery, laundry-work, housewifery, and hygiene. He had written on this matter to Mrs. Homan, the member of the School Board who had charge of these matters, and she stated that this Joint Committee's scheme was actually introduced into the schools of the London School Board with certain modifications, and that at the present time there are 18 centres in different parts, in which it is being taught. In these various ways the matter was being introduced to a certain extent, but they wanted to have it more thoroughly organised. There was, of course, the great question as to how far it should be insisted upon in the teaching in all schools. Miss Ravenhill spoke of the practical demonstration as being preferable to the preparatory Reader. No doubt that would be desirable; how could they teach such a thing as hygiene by a Reader? He had heard some good lectures on hygiene, and one in particular he remembered as being given by a lady to a number of girls, who listened most attentively to the subject of making a poultice. How could they teach girls to make a poultice by books? In this case the lady had all the materials before her, and she showed practically the whole process. In this actual demonstration the children were most interested, and its careful explanation proved the value of the method advocated by Miss Ravenhill. It was sometimes objected that school life is too short for these things. Undoubtedly it was very short; they would like to teach so many things, and even when they got the school life extended by a year or two, he supposed they would still find that it was too short. Well, then, it appeared to him that their object should be to get such matters taught in the schools as shall, if possible, serve two purposes. There were a good many subjects taught which served only one purpose, but if they could find some-

thing which drew out the various faculties of the mind—perception, comparison, and so on—and at the same time be of some practical service to the child, then they had a double advantage from the teaching. If this teaching of hygiene and the laws of health starts from the home, as indicated in the paper, making it an object lesson, the children taking part in the little experiments that are being made, they got all the advantages of training the perceptive faculties, of making them observe how to use their little hands for various purposes, and also enabling them to compare things—there was a scientific faculty being drawn out, and their minds were trained in a way that few other subjects would be able to train them. It had all the advantages of other scientific training and could be carried out with very young children; it also had the advantage that it was a subject which would be of practical value to them throughout the life which lay before them. Little children ought to know something of how to regulate their own bodies, how to get out of draughts, and when they have got wet how to get dry again. There were many things like this which they might learn when they were very little, and they would take an interest in all those things, because the child's own frame was an interesting thing to itself as well as to its parents and friends, and it would be interested indeed in knowing how to overcome some of the difficulties and trials that it experiences. The conversational method spoken of in the paper was, of course, that method which they would like to see carried out as far as possible in all our teaching. Books might come in afterwards, but books were very obscure things to little children. There was all the difficulty of the meaning of words, all the difficulty of reading them, all the difficulty of construction, for they are often not written in a familiar style. But if they began to talk to a child they soon began to draw out all that was in its little mind, especially if there were things to look at, play with and work on; afterwards they might go into those more intellectual regions which books represent, and then it would be able to extract the meaning out of books and to use them properly. He thought they would all feel that the body and the mind must work together; that had been a matter well known in the history of education, though perhaps somewhat forgotten of late years, for most attention had been paid to purely intellectual matters; but they could not have a healthy mind without a healthy body—at any rate, it was very rare indeed. They believed that that body is just as much the good gift of God as the mind, and it was right they should take care of it, and use it to the very best purpose. Health we ought to have in order to properly perform the duties of life, and it was the healthy men and women who were capable of discharging them best. Health was also necessary for keeping a good temper. When our nerves were out of order we were unable to do useful work, except by dragging along, and there could not be much happiness under those circumstances. Then our judgments we could keep cool if our bodies were in good condition, and in various ways we should find that, intellectually and morally, we are all the better for being in good health. Think, too, of the great advantage

for the coming generations if the fathers and mothers are in good health. We must not allow that there should be growing up among us those who inherit the weakness of past generations, but rather see that there is such an education given to those who are growing up to be the parents of future generations as shall make these future generations far better than all those which have passed. He did feel that our bodies ought to be the ready servants of our minds, but in order that the body should serve the individual well and the community well, it must itself be well taken care of; and we must draw out the minds of the little children by teaching them how to be healthy and strong, and to do easily, pleasantly and well all the various duties of life.

Dr. H. R. Kenwood (London) said that, as one who had on more than one occasion in public pronounced the measure so ably advocated by Miss Ravenhill as the greatest step which can now be taken in the cause of preventive medicine, he found himself in entire agreement with the substance of her paper. From his own enquiries he could corroborate the statement that only a bare 1 per cent. of the children in this country receive any instruction in a subject of such vital importance as hygiene. As a Medical Officer of Health, he daily witnessed instances where ignorance of the laws of health, ignorance of the rudiments of sanitation, and ignorance of the simple preventive measures which may be taken against the spread of infection, are followed by their Nemesis of disease and death. In the enormous amount of preventable disease, affecting the first year or two of life, there is practically little scope for our legislative machinery and municipal control, and it is impossible to enforce all the necessary preventive measures of a simple nature, which ought to be known and practised by those who have parental responsibilities. That helpless section of the community had therefore to pay an enormous annual toll of mortality to parental ignorance, which no measures of the sanitary authority could reduce. A large percentage of that mortality could only be prevented by the adoption of the measures advocated that evening. All organised efforts to educate adults had met with scant success. The simple knowledge of the laws of health and disease prevention must be instilled into those who are receiving their general education, whose minds are plastic, and whose characters are forming. Surely the scheme is practicable; there are subjects taught in schools which not only might but ought to give place on the score of expediency, usefulness, and even of humanity to such a subject as the elements of health and self-preservation. As Herbert Spencer had pointed out, "the momentous question which has to be settled in deciding upon a code of education is not whether such or such knowledge is of worth, but what is its relative worth." Respecting the true measure of value, as expressed in general terms, there can be no dispute. Everyone on contending for the worth of any particular order of information, does so by showing its bearing upon some part of life—the way it conduces to happiness. How to live completely; that was the essential question for us. And that being

the great thing needful for us to learn is by consequence the great thing which education has to teach, and the only rational mode of judging an educational course is to judge in what degree it discharges such function. As entire ignorance in all other directions would be less promptly fatal than entire ignorance in this direction, it must be admitted that knowledge immediately conducive to self-preservation is of primary importance. Why then was hygiene not included among the compulsory subjects, since no one could ever be found to dispute its prime importance? Miss Ravenhill had considered and disposed of some of the reasons, and he thought they could all be equally cogently advanced against many of the subjects that are already taught. The argument most frequently used is that there is no room for the subject of hygiene. That argument to him seemed just as pertinent as if it were contended that the necessary amount of cubic space essential to health and life could not be allowed because a room is also used for storing a large number of articles of varying degrees of utility, and the means by which the difficulty must be removed in either case seemed equally obvious. Room had been made in Leeds, where, in their wisdom, they consider the health and vigour of future generations of even greater importance than a knowledge of scanning and parsing. Room could be made therefore, and he agreed with Miss Ravenhill that if Hygiene was made a grant-earning subject, room would be made. The omission of the subject from any code of education was unintelligible from any stand-point. Even if they considered the subject from a point of view which appeals to so many, viz., that of £ s. d., they would see that such education by the State is a most profitable investment. Success in life depends more upon physical energy than on information, and a nation's wealth and power is the sum of the vigour and energy of its citizens rather than of their brains. No one who had any knowledge of the subject would dispute that thousands of easily preventable deaths occur each year in England. To the thousands of children that are killed annually in this country alone, one might add tens of thousands who survive with enfeebled constitutions, and many more who reach the working years of life with constitutions not so strong as they ought to be; then one could form some idea of the curse inflicted on helpless offsprings by parental ignorance of the laws of health. The Imperial Health Manual, issued by the Imperial Health Department of Germany, well illustrated the cost of sickness—"The magnitude of the losses arising from the impairment of health can be estimated from the statistical return of the working men's sick clubs in Germany. In 1891, out of a total membership of 6½ millions, there were more than 2 million cases of sickness, and each sickness lasted an average of 17 days. The clubs paid in expenses £4,475,000. As it is safe to assume that among the remaining 48 millions of German citizens, 24 millions of whom are old enough to work, the cases of sickness were equally numerous and equally protracted, the expenses occasioned by sickness in Germany in one year is not rated too high at £25,000,000." Think of the enormous waste all this entails to the State, and then wonder why the State neglects to take every means

in its power to lessen it. Miss Ravenhill had admirably indicated how the subject might and could be taught and made interesting as well as instructive, and he hoped that meeting would advance them a step towards the goal which all the thinkers and workers in public health desire to see reached.

Professor J. LANE NOTTER (Southampton) remarked that Miss Ravenhill's paper was an example of the method she had advocated, simplicity of treatment. There was satisfactory evidence that the subject of hygiene had more interest taken in it now, and was more widely taught; indeed, the students in this subject in the Science and Art Department had nearly doubled during the last five or six years. The class of papers, too, was infinitely better than it was a few years ago; there was more intellectual grasp of the subject, less teaching by *rôte*, and since diagrams had been dispensed with, and models substituted, there was a marked improvement which bid well for the future. They were all deeply indebted to Miss Ravenhill for the interest she had taken in this subject; her "extended course" was one of the most admirable papers he had ever had the pleasure of perusing, and he sincerely hoped that that meeting, and the interest she had taken in the matter, would lead to a wider public interest in the subject generally, particularly throughout the educational centres, so that they might get more of the teaching of personal health among the younger children, even at the sacrifice of some of the other subjects now taught. There was nothing which tended to make life more happy, growth more vigorous, or that was a better investment, than the study of this subject.

Mr. H. MACAN (Kingston-upon-Thames) said that he cordially concurred in the spirit of Miss Ravenhil's remarks and in her conclusions, and therefore perhaps she would forgive him if he broke a lance with her on one or two little points. In the first place, with reference to her remark "that those elected on local public bodies were often ignorant;" as long as by law ladies were prevented from being elected on certain of these bodies, he thought they would do well not to pass strictures upon the work which was done, and of which they had no direct knowledge. He believed these local bodies all over England, from the county councils to the parish councils, on the whole, were deeply interested in these subjects, and that besides they had what Socrates called the highest knowledge of all—the knowledge of what they did not know; they did not pretend to be experts in the science of hygiene; they did what is better—they appointed expert officers to advise them upon these matters, and they took their advice. Nothing stronger he thought could be said in their favour. Miss Ravenhill also mentioned that a great deal of failure had taken place in connection with the lecture work among adults—work which had been undertaken during the last few years by various public authorities. He ventured to differ from her on that point. He did not hesitate to say that if they were to get at the root of the question they wanted to get at that

evening—the teaching of youth—they must begin with the teaching of the parents. They would never educate public opinion so as to get these subjects taught to children until they had so far educated the parents of the children by showing them the value of these subjects. He had worked with some seven or eight ladies of ability and talent during the last few years, and they had not been of that despondent and dissatisfied tone which must have characterised some of the ladies Miss Ravenhill must have met in this connection. Those ladies whose work he knew had had passing through their hands thousands of people—nearly two thousand pupils had submitted themselves—to particularly difficult examinations conducted by bodies like the National Health Society, and a very large number of these adults had passed; from year to year they had gone through the various grades, taking the first year First Aid; the second year Home Nursing, in the third year Advanced Ambulance, and in the fourth year Hygiene and the Laws of Health. Now, when they found busy adults—many of them humble agricultural persons, living in distant villages, taking up this work and passing these difficult examinations, attending regularly these lectures and classes, he did not think they could say there had been any kind of failure in the work which had been undertaken by these lady lecturers—teachers among the adults under the provisions of the Technical Instruction Act. With these exceptions, he cordially concurred in the spirit of the paper, which raised a very wide question as to whether our system of elementary education is really right at bottom. Dr. Kenwood seemed to agree that something of the same kind was raised in the paper. One of his old tutors at Oxford, the late Professor Henry Smith, said upon a celebrated occasion that he had devoted his life to the study of the theory of numbers, because by no chance could it be of any use to anybody. That doctrine appeared largely to permeate our educational system, especially the elementary educational system. Excellent, well-meaning, and highly educated persons in the past had considered that what you had to do was to boil down the education given at Eton and Harrow, Balliol and Trinity, and when boiled down, to dilute this with twice the amount of water to produce secondary education, and with four times the amount of water to produce elementary education. The object of education—fitting persons for the life that had to be lived, and fitting, as every grade of education ought to do, the majority of the persons taught for the life which they are morally certain to have to live—that main object of education has been very largely forgotten, and he believed it had been forgotten more in the sphere of elementary education than perhaps in any other grade. With his experience of secondary and technical education, he entirely concurred in the opinions which had been expressed, and were lately expressed in the debate in the House of Commons, by Sir John Gorst, that in the rural districts at any rate, a great many of the subjects now taught ought to go by the board. For a person who was going to be an agricultural labourer, it was infinitely more important that he should learn gardening than that he should learn history or geo-

graphy, and he believed it was equally formative of character. For the girl who was going to be the wife of a working-man, it was infinitely more important that she should learn the subjects which had been set before them by Miss Ravenhill, than that she should learn English grammar or composition. He hoped that meeting would produce some effect, and these meetings generally did, when they were followed up by strenuous effort on the part of those interested, in the highest quarters; if it did he believed it would be in the direction of bringing into school life the idea of the "workshop," and abolishing the idea of the "schoolroom"—an endeavour to make children, even at the earliest ages of their school education, see the object of the subjects they learn, that they are practically taught with surroundings which have a bearing on their future life, and are not taught them in an academic or bookish manner, which, however excellent in making professors and philosophers, is absolutely unsuited to the masses of this country.

Dr. KIMMINS (London) observed that he had listened with a great deal of pleasure to Miss Ravenhill's paper, and unlike Mr. Macan had no lance to break with her. He was very glad to hear so distinguished an authority as Dr. Gladstone say that the courses of instruction she recommended could be used from an educative point of view, because he had thought that was the weak point. That was where the difficulty would come in in getting this very widely taken up in schools, but when Dr. Gladstone said that here was a scheme of instruction which could be made of the greatest value in training the powers of observation of children, then that difficulty was to a large extent removed, and it would ease matters very much indeed. The chief difficulty was that pointed out by Miss Ravenhill of getting the right kind of teachers for such instruction. With good teachers there should be no difficulty whatever in making these subjects attractive to young children. But he doubted, however, whether it would be wise to agitate at present for their introduction in the lowest standards. He thought it would be wiser to try to get them thoroughly taken up in Standards 4, 5, and 6, and also make a powerful effort to get them introduced generally in the Continuation Schools where they would be of the greatest possible value, because such instruction as Miss Ravenhill suggested was not only to train the children, but also to train the parents to a certain extent through the children. A child in Standard 1 had not much influence in the home, so far as the instruction of the parents was concerned, but when a child reached the higher standards it began to make its influence felt, and then could carry instruction into the home. So he would far rather see more time given to those subjects in Standards 4, 5, and 6 than for them to be taken over the whole school course. This might appear a small matter, but it was an important one from that particular point of view. He wished Miss Ravenhill every success in the splendid work she was doing in extending this instruction in our schools.

Dr. Warner (London) was very glad to have the opportunity of thanking Miss Ravenhill for her paper, and said that in his opinion nothing could be more important for the benefit of future generations than care of the sanitation of childhood. Hardly enough stress had been laid upon the enormous amount of brain damage done to children by the neglect of sanitation. It had been his lot to see many children, in both town and country, and all knew how ricketts, preventable by hygiene, damaged the brain power of the population, with its consequent neurotic conditions. With regard to the teaching of hygiene in schools, he knew nothing of it except its great desirability. He had seen such teaching given in schools, and he did not believe that there was anything else, any examination or knowledge, which would make up for it. Something had been done in the towns and the large centres, but he believed that every school required a sanitary caretaker, not in the sense of a housekeeper, but something like a nurse who could teach them the care that should be taken in the lavatories, in the passages, in the cloak-rooms, in the matter of ventilation, and other details of that kind. He hoped that what had been said that night would be taken to heart.

Dr. Shuttleworth (London) remarked that he was hardly qualified to speak on the subject, as his knowledge of schools was mostly confined to those special schools provided for mentally defective children. Really the hygiene which had been insisted upon as a necessity of education ought to have been carried out a generation back, and then probably there would not havè been so many defective children for him to supervise. But he could not help being impressed with the ideas Miss Ravenhill had put before them that evening. He agreed with her that the subject of the laws of health, treated of course simply and very practically—starting by inculcating cleanliness—cannot be too early put before the children in our schools. He happened to have read recently the Code of Regulations for Elementary Schools, and he noticed that hygiene was mentioned as an optional subject in connection with the day school code, but from the Schedule it appeared to merge into the general subject of Domestic Economy. If that were so, it seemed that this instruction would be confined to the female portion of the school population. In these days when so much was heard of the rights of women, he thought they would soon have to put in a plea for the rights of men; the boy equally with the girl ought to be taught matters which are important in the keeping up of his health, and as Miss Ravenhill had remarked, helping him in after-time to do his duty as master of a house. There was another point upon which not so much had been said; if it were desirable to teach hygienic principles, who was to teach them? Turning to the Schedule of the curriculum for pupil teachers, he did not find there that hygiene was a compulsory subject. He thought it ought to be, and rank above such subjects as terrestrial magnetism, for instance; elementary physiology and hygiene ought to form part of any curriculum for the training of teachers; for those were matters practically more important than

some of the scientific subjects which now figure in the Schedule. Some five or six years ago, as a lecturer appointed by the Lancashire County Council, he had the opportunity of a good deal of conversation with Elementary School teachers in the North as to hygiene, and he could vouch for the interest with which lectures on this subject were received by a large audience of headmasters and headmistresses of the elementary schools. Though well-informed generally, he found that the ideas of some of them were crude, not to say defective, on this subject, for example, in regard to ventilation and the reasons for it; a matter most important in school management. He was quite sure hygiene might be made attractive to children, and as an examiner in connection with the St. John's Ambulance Society could testify to the interest which was taken by young and old in subjects of this nature when they were properly put before the pupils, and practically demonstrated. He was, in fact, sure that hygiene would be one of the most popular subjects in the school course, and it might be made thoroughly educative and scientific.

Mr. MAJOR (Leicester) said that the only claim he had to speak on the subject under discussion was that he had carried out for the last eight years some such system as that advocated by Miss Ravenhill. By some chance coincidence they had been working along parallel lines, unknown to each other until about a fortnight ago. Eight years ago Government gave permission to the Leicester School Board, and the other Boards throughout the country, to choose its own subjects to a limited extent, and he had immediately seized the opportunity to banish parsing and analysis out of their schools, and to put in instead the practical subject of hygiene, under the name of domestic economy, with the permission of the Government inspector. To do this, he had had to forsake the boundaries which the Government had laid down under the term of domestic economy, and to incorporate instead the principles laid down by Miss Ravenhill. He also began with Standard 1, whereas domestic economy was limited to Standards 4, 5, and 6. The very fact that so small a portion of time could be given to the subject made it imperative to begin it early. His experience for eight years, with 8,000 girls, was that the subject could be made eminently attractive and educative, and that it was extremely interesting. The outcome had been that the banishment of parsing and analysis had not been felt at all; they had met the want in another way. The subjects of composition had been the subjects of hygiene—the laws of health; they had opened up the minds of the children, and they had taught through these two subjects the power of expression much more than ever could have been done with mere classification and rules of grammar. He had felt so strongly that boys ought to have this subject as well as girls, that in all large schools of over a thousand children, where the Standards break up into three classes of about 60 each, he prepared a syllabus of elementary science for the boys along domestic economy lines, and the boys sprung to it just as readily as the girls. The best teachers of this subject were males. So encouraged had he been with the

results, that last year he had tried the subject of ambulance in the Continuation Schools, and next year he intended to continue it in every centre the Board had. The Leicester School Board was the first to send boys and girls up for the St. John's Ambulance Examination, and the result was that 51 out of 63 got their certificates. This year his numbers would be 300 per cent. greater. He desired, in conclusion, to say one word in favour of books on hygiene, which had been deprecated. There were two directions in which books might be made a great deal of use; first, they would not get the teachers so readily to take this up as a new subject without a reading book; without being able to show in this way that the subject could be made attractive they would get a great deal of prejudice from the teachers against the introduction of a new subject. With a Reader this would be removed. Then there was the further reason that elementary education dealt with children as if they were all ears and no eyes; they were dosed with knowledge of a *vivâ voce* character, given to them homœopathically, so that the child could hardly any longer use his brains or his eyes. They should remember four words—experiment, observation, induction, and suggestion—and not regard a child as an open receptive vessel into which they could cram so much information in the course of half-an-hour. While he agreed that the greater part of the training should be *vivâ voce*, he pleaded that if the child was to be left with any instruments of education at all it must be by his being made to understand and to appreciate and to wrestle with the book when the teacher is absent.

The CHAIRMAN (Rev. T. Sharp, C.B.) remarked that they had a most interesting paper and discussion that evening from those well qualified to speak on the subject, and he thought that they had been rather hard upon the Education Department. Perhaps it was not known that any body of school managers might select whatever subjects beyond the three R.'s they were pleased to teach. They might put hygiene immediately after reading, writing, and arithmetic; they could not only choose their subjects, but draw up their own scheme of objects and submit it to the inspector. Therefore, so far as the Education Department and the inspectors were concerned, they were perfectly blameless, for they allowed managers to select as they pleased. But he thought it was more a question of teachers than managers, whether they were competent to teach this subject; and therefore the blame rested on the training colleges whether this subject should be made one of essential importance, and teachers should go out perfectly qualified to teach it to both smaller and bigger children. He could not quite agree with Miss Ravenhill that this subject should be taught in the two lower standards, because one should never introduce abstract ideas to children of that age; they should be taught entirely by experiment and observation. He was very ignorant about sanitation himself, and always appealed to the sanitary authority of the district to correct him if he were wrong. Object lessons in schools might be

illustrated from some of the things they saw about them: they could give a good lesson on the D. trap, and illustrate the principle of the syphon, for children would look at running water for five minutes on end: afterwards they could pass to the pressure of water and the Bell trap, and so on. This question of teaching rested with the teachers and the managers; perfect freedom exists in the elementary schools as to what should be taught, but sometimes the managers were those who had had a liberal education themselves at college, and who, as Mr. Macan said, watered that education down as far as they could until it reached the fourth stage of dilution, and was then applied to the elementary school. With regard to physiology, he should like to remark that lessons in this subject had been given in times past in a disgraceful way, for they were a mass of scientific technical terms got up for examination; this still lingered in some secondary schools, though he thought it was almost extinct in the elementary schools. To get up a subject for examination only, and then forget it in two or three months was not teaching; what was wanted in the elementary schools was perfect simplicity and with all ideas put before a child well illustrated. He thought also they had largely got rid of the prigs and pedants; with human knowledge increasing so much no one could pretend to any very great amount of knowledge—such a pretender was what he called a prig—and the pedant was the man who parades his knowledge before the world. Knowledge was now so extensive that the pedant had not now very much chance of showing he was wiser than his neighbour.

Miss Ravenhill (London) in acknowledgment, thanked those present for their kind appreciation of her efforts to bring this subject into the prominence it deserved, and expressed her earnest hope that seed had been sown that evening which would eventually bear fruit. She felt much flattered and encouraged by Dr. Gladstone's approval of her suggestions and scheme of instruction. In reply to some of the friendly criticisms, she remarked that after some experience of Local Health Authorities in various parts of the country, she had not found that they were always ready to supplement their possible ignorance of a subject by immediately taking the advice of their expert officers in the way that had been suggested! She was not at all desponding as to the work done under County Councils by Hygiene Lecturers, but simply drew attention to the *comparatively* meagre results of their labours, as shown by the death and disease rates of the country. The good work had been going on for some years, and still the results were small and variable. It seemed to her that until the foundation of sanitary knowledge could be laid in the time of youth, much practical advance would not be made in raising the National Health Standard. She felt the ends sought would not be gained by only providing for the teaching of adults and not beginning with the children. For that reason she was exceedingly encouraged by the support received from several speakers in favour of teaching quite young children. She could not

agree with Dr. Kimmins in saying this teaching had better be reserved for the higher standards, the reason why had been brought forward in another connection at the Cambridge meeting the previous week, where attention had been drawn to the fact that a very extensive leakage takes place from our Elementary schools, especially among the very poorest classes after standards 3 or 4, and so long as this teaching is confined to the upper standards, so long would a large number of the poorest children—those who needed the teaching most—be deprived of the training in health habits so essential to their welfare in their future lives. As to extending the teaching to both boys and girls, Mr. Major had given her valuable support by showing what had been done in this direction at Leicester, and she wished more teachers had been present to point out any difficulties which might present themselves against extending the system. Personally she had not much faith in Reading books, and believed that these lessons ought to be dealt with practically, not theoretically. Teaching in the form she had suggested could not properly be described as teaching the children as if they were all ears and no eyes; if the school apparatus or thoroughly good models were made use of, she could not help thinking these would carry more conviction than by any amount of time spent over even the most admirable Readers. Of course, if Readers had to be used as a bait for the teachers, then their preparation would have to be considered as one means to attain a good end. She had hoped to have heard some expression of opinion that evening as to the best method of arousing the interest of the teachers, and had also hoped that something would have been said as to what steps should be taken to do this in the Training Colleges, but evidently these points must wait for a future occasion.

Miss Ravenhill exhibited and explained a large model of a working-class dwelling for use in teaching in elementary schools.

REVIEWS OF BOOKS.

THE PURIFICATION OF SEWAGE.*

This book of some 140 small pages of printed matter, is, as the author claims for it, a brief account of the scientific principles of sewage purification and of their practical application; and it possesses the welcome feature of recording the experiences and opinions of one who is not interested in any particular process. In many respects Dr. Barwise might have increased the bulk of the work with advantage, for in its present form it is far too brief to be of the fullest value to engineers and other officials who wish to avail themselves of the latest researches of chemists and biologists upon the question of sewage purification; but that the members of the various bodies upon whom devolves the duty of dealing with the problem of the purification of sewage should grasp the scientific principles of the subject, is important, and these will derive considerable benefit from its perusal—for the whole range of the subject is surveyed. The reader is taken over the nature and composition of sewage, the changes it undergoes in purification, the standards of purity for sewage effluents, the explanation of chemical terms as employed in sewage analysis and reports, river pollution and its effects, the land treatment of sewage, sewage precipitation, precipitants and tanks, artificial filters and the results obtained from them, bacteriolysis and the selection of methods of sewage disposal. And all this in 140 small pages!

Dr. Barwise has enjoyed considerable opportunities, both by his training and his public office, of studying the subject, and seeing that the work was in such competent hands it is somewhat disappointing to find it performed in such a fragmentary manner. The insufficient treatment of the subject must tend to create some false impressions in the minds of those who are not, to some extent, *au courant* with this extremely complex subject. Scott-Moncrieff's installation, for instance, is described as follows:—He "liquefies the organic matter by straining the sewage through shallow channels filled with flint, upon the surface of which the liquefying organisms grow." Who could possibly recognise Scott-Moncrieff's installation by this description?

It is not often that the only fault that a reviewer has to find with a book is on the score of its brevity, and when this is so a compliment is implied to the author. Dr. Barwise has written a useful little work, and has treated a rather forbidding subject in an engaging manner; and if he doubles the bulk in a subsequent edition, he will increase its value many fold.

H. R. K.

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* By Sidney Barwise, M.D., M.R.C.S., D.P.H., Medical Officer of Health to the Derbyshire County Council. London. *Crosby, Lockwood & Son.* 1899. Price 5s.

NOTES ON BOOKS AND PAPERS IN TRANSACTIONS.

The Principles and Practice of Modern House-Construction. Edited by G. Lister Sutcliffe, A.R.I.B.A. 6 vols., 4to. Blackie & Son. London, 1898. *Price 8s. per Vol.*

Five out of the six volumes of this work have now been issued.

The intention of these volumes is to provide accurate and up-to-date information for professional men engaged in house-construction, and to attain this object the publishers have engaged well-known authorities on the various subjects dealt with to contribute the articles to the several sections.

LIST OF SECTIONS AND AUTHORS.

General Introduction		F. W. Andrews, M.D.
Sec.	I.—Plan	Prof. R. Kerr, F.R.I.B.A.
"	II.—Construction	G. Lister Sutcliffe, A.R.I.B.A.
"	III.—Water Supply	Henry Law, M.Inst.C.E.
"	IV.—Domestic Water Supply	Henry Clay.
"	V.—Household Filters	H. Josse Johnson, M.B.
"	VI.—Sanitary Plumbing	Henry Clay.
"	VII.—Sanitary Fittings	Keith D. Young, F.R.I.B.A.
"	VIII.—Drainage	W. Spinks, A.M.I.C.E.
"	IX.—Sewage Disposal	H. P. Boulnois, M.I.C.E.
"	X.—Warming	E. R. Dolby, A.M.I.C.E.
"	XI.—Warming and Cooking by Electricity	E. A. Claremont, M.I.E.E.
"	XII.—Ventilation	W. Henman, F.R.I.B.A.
"	XIII.—Lighting—Candles, Oil, Electricity	E. A. Claremont, M.I.E.E.
	Lighting—Gas	H. Clay.
"	XIV.—Gas-producing Apparatus	J. M. Somerville.
"	XV.—Furniture and Decoration	E. F. Willoughby, M.D.
"	XVI.—Sanitary Inspection of Houses	W. H. Wells.
"	XVII.—Improvem't. of existing Houses	G. L. Sutcliffe.
"	XVIII.—Climate and Situation	E. F. Willoughby.
"	XIX.—Stables	F. W. Lockwood, F.I.S.E.
"	XX.—Sanitary Law	A. Wynter Blyth, M.R.C.S.

The illustrations form an important feature—upwards of 700 are to appear in the completed work.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions.
Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

Science in relation to Hygiene and Preventive Medicine.

DIRKSEN, Dr. H., and SPITTA, Dr. OSKAR. Die Veränderungen des Spreewassers auf seine em Laufe durch Berlin in bacteriologischer und chemischer Hinsicht. *Arch. f. Hyg.*, Bd. XXXV., Hft. 2, 1899, p. 83.

Bacteriological and chemical changes in the water of the Spree in its course through Berlin.

McWEENY, Prof. E. J., M.D. Tubercle and Pseudo-Tubercle in Butter. *The Journal of State Medicine*, June 1899, p. 350.

A summary of recent bacteriological researches on this subject.

SCHATTENFROH, Dr. A. Weitere Untersuchungen über die bacterienfeindlichen Stoffe der Leukocyten. *Arch. f. Hyg.*, Bd. XXXV., Hft. 2, 1899, p. 35.

Further investigations on the substance in leucocytes which is hostile to bacteria.

STADLER, EDUARD. Ueber die Einwirkung von Kochsalz auf Bacterien die bei den sog. Fleischvergiftungen eine Rolle spielen. *Arch. f. Hyg.*, Bd. XXXV., Hft. 1, 1899, p. 40.

On the action of common salt on the bacteria which play a part in so-called meat poisoning.

STEPHANIDIS, Dr. PHILOPIMIN. Ueber den Einfluss des Nährstoffgehaltes von Nährböden auf die Raschheit der Sporenbildung und die Zahl und Resistenz der gebildeten Sporen. *Archiv f. Hygiene*, Bd. XXXV., Hft. 1, 1899, p. 1.

The influence of the nutrient capacity of culture media on the quickness of spore formation, and the number and resistance of the spores formed.

SYMES, J. O., M.D. Notes on the Presence of the Bacillus Coli and other Organisms in the tissues ater Death. *Lancet*, 11th February, 1899, p. 365.

Results are given of post mortem examinations for organisms in the tissues. Of 50 examinations the *bacillus coli* was not infrequently found. This was so in 40 per cent. of the cases, and the opinion is expressed that its presence in the organs and tissues was ante-mortem.

CAMERON, Sir CHARLES A., M.D., and SMITH, Prof. W. R., M.D. The Composition of Brandy. *The Journal of State Medicine*, June, 1899, p. 317.

CLAYTON, E. G. On some Analyses of Ginger. *The Analyst*, May, 1899, p. 122.

Gives the results of an analysis of 37 samples of ginger, including (*a*) whole gingers, washed and unwashed; (*b*) commercially-ground gingers; (*c*) spent gingers, &c.

KONINGH, L. DE, F.I.C. Notes on Milk Analysis. *The Analyst*. June, 1899, p. 142.

Deals with the analysis of sour milks, the detection of cane sugar and of boracic acid.

LEHMANN, Dr. K. B. Der Kohlensäuregehalt der Inspirations-luft im Freien und in Zimmer. *Arch. f. Hyg.*, Bd. XXXIV. Hft. 4, 1899, p. 315.

The amount of carbonic acid of the inspired air in the open and in a room.

LEONARD, NORMAN, F.I.C. A new test for Formaldehyde. *The Analyst*. April, 1899, p. 86.

A new test for the detection of formaldehyde when added to milk samples in order to preserve them.

WHITE, JOHN, F.I.C. Caper Tea. *The Analyst*. May, 1899. p. 117.

Gives the results obtained on analysis of many samples of caper tea taken from various parts of the county of Derby since June, 1897, under the Sale of Food and Drugs Act, and shows that some sophistication of caper tea is practised at the present day.

CAIGER, F. FOORD, M.D. The Diagnosis of certain Notifiable Diseases. *The Lancet*. 17th June, 1899, p. 1617.

Discusses the early diagnostic signs and the value of the bacteriological methods of diagnosis in the case of certain of the notifiable diseases.

GERRARD, P. N., M.D. The Influence of Rainfall on Beri-beri. *The Lancet.* 11th February, 1899, p. 367.

An analysis of 2,422 cases met with in 7 years in relation to the rainfall, points to the probable fallacy in the theory of the coincidence of the disease with wet periods. It is suggested that the disease may have a casual relationship with the opening of mines.

HORTON-SMITH, P., M.D. On the Respective Parts taken by the Urine and the Fæces in the Dissemination of Typhoid Fever. *The Lancet*, 20th May, 1899, p. 1346.

Facts and arguments are brought to show that the stools contain bacilli early in the attack and up to the beginning of the third week or later, and later still if there be a relapse. As regards the urine, in about 25 per cent. of the cases bacilli are found, but rarely before the third week, and they may continue for a considerable period after convalescence.

JOHNSTON, JOHN, M.D. Measles and Scarlet Fever co-existing in the Same Person. *British Medical Journal*, 31st December, 1898, p. 1928.

Case recorded of an attack of scarlet fever immediately following an attack of measles.

LETTERS, PATRICK, M.D., D.P.H. The Prevention of Measles in Rural Districts. *The Journal of State Medicine.* June, 1899, p. 333.

LINDSAY, W. J., M.B. On Antistreptococcic Serum in the Treatment of Small-pox. *British Medical Journal*, 13th May, 1899, p. 1144.

From cases quoted, the conclusions are regarding the effect of the serum treatment (1) shortening of critical period following the absorption of the pustules, (2) toxemia seems less, (3) less tendency to cardiac failure, and (4) earlier and more rapid recovery.

LIVI, RIDOLPHO, Dr. On Vaccination and Small-pox in the Italian Army. *British Medical Journal*, 29th April, 1899, p. 1017.

Thirty years' figures (1867–97) are given to show the effect of vaccination in the Italian army, and then strongly point to both a reduction in the liability to attack in the case of vaccinated persons, and a great modification in severity in the vaccinated who are attacked.

NEWSHOLME, ARTHUR, M.D. The Prevention of Phthisis, with special reference to its notification to the Medical Officer of Health. *The Lancet*, 4th February, 1899, p. 279.

Arguments are set forth in support of (*a*) the inclusion of phthisis among the list of infectious diseases which may be included among

notifiable diseases; (b) the power to pay for notification volunt given; and (c) the bringing up to date and codifying other sani legislation which has an important bearing on the preventio phthisis.

SALTET, Dr. R. H. Enteric Fever in the Netherlands. *Lancet*, 27th May, 1899, p. 1434.

Figures are given which show a reduction of 72 per cent. in en fever mortality in urban, and 60 per cent. in rural populations chief causes being improved water-supplies and general sanita The greater reduction in the urban was probably the result of populations enjoying to a greater extent the advance in me science.

SESSIONS, HAROLD, F.R.C.V.S. Tuberculosis and the D Farm. *The Hospital*, April 15th, 1899, p. 43.

Dealing with the causes of the disease. The public demands. protection of the farmer and preventive measures.

SLADEN, E. SIDNEY ST. B., M.D. Influence of the Supply on the Spread of Tuberculosis. *The Lancet*, January, 1899, p. 74.

An investigation of the different milk supplies of the colleg Cambridge demonstrated by inoculation of guinea-pigs that than one-half were capable of conveying tuberculosis.

SMITH, Capt. FRED., R.A.M.C. Malaria; Immunity; sence of Negro Immunity; Variety. *British Medical Jou* 17th December, 1898, p. 1807.

Arguments are advanced to show that the negro races do from malaria, although in a mild form, and that there are pro more than one form of malarial fever.

SYKES, WM., M.D. On the Incubation Period of Varicel Chicken-pox. *British Medical Journal*, 14th January, 1 p. 81.

Cases are quoted which point to the incubation period varying six to nineteen days, the suggested causes of the varying pe being the strength of poison introduced and the tissue-resistan the person infected.

WISE, A. TUCKER, M.D. Infection of Tubercle from S Birds, a Fertile though Unsuspected Source of Pht *The Lancet*, 20th May, 1899, p. 1359.

A series of cases are given which point to the possible ri phthisis being conveyed by cage-birds.

THOINOT, Dr. L. Le Role de L'Initiative Privée en Matière d'Hygiène Publique. *Annales d'Hygiène Publique*, April, 1899, p. 338.

An eloquent and detailed plea for the general application of prophylactic measures, showing how thus typhoid fever, cholera, tuberculosis, etc., might be avoided, even though no municipal or imperial preventive measures were adopted.

WINKFIELD, ALFRED, F.R.C.S. On the use of Antitoxin in Diphtheria. *The Lancet*, 15th February, 1899, p. 520.

Since the use of antitoxin in Oxford, a reduction in the mortality from diphtheria has taken place—from 34·3 per cent. mortality to 14·1 per cent. In no case did laryngeal symptoms set in after the use of antitoxin.

Hygiene of Special Classes, Trades and Professions, and Municipal Administration.

BAILEY, T. J., F.R.I.B.A. The Planning and Construction of Board Schools, with discussion. *The Builder*, 3rd June, 1899, p. 539.

Description of all the various kinds of schools built by the London School Board, with notes of their cost, &c., and plan of Finsbury Pupil Teachers' Centre. The paper was read at the Royal Institute of British Architects.

HARPUR, W., M.Inst.C.E. Public Baths: a Letter to the Editor, illustrated. *The Builder*, 15th April, 1899, p. 373.

The author suggests the combination of washing and swimming baths. The illustration shows warm lavatories in use at Cardiff to afford the cleansing facilities of the Turkish bath in conjunction with the swimming bath.

SPALDING, CROSS and HARE, Messrs. New Shoreditch Baths: Description and plan. *The Builder*, 25th March, 1899, p. 305.

It gives the accommodation, materials, general arrangements, &c.

LEHMANN, Dr. K. B. Experimentelle Untersuchungen über die Gewöhnung an Fabrikgase. (Ammerriak, Chlor, Schwefelwasserstof). *Arch. f. Hyg.*, Bd. XXXIV., Hft. 4, 1899, p. 272.

Experimental investigations on the becoming acclimatised to factory gases (ammonia, chlorine, hydrogen sulphide).

—— Wieviel Chlor nimmt ein Hund in einer Chlor-Atmosphäre auf und auf welchem Wege? *Arch. f. Hyg.*, Bd. XXXIV., Hft. 4, 1899, p. 308.

How much chlorine does a dog take in in a chlorine atmosphere, and in what way?

LEHMANN, Dr. K. B. Experimentelle Studien über den Einfluss technisch und hygienisch wichtiger Gase und Dämpfe auf den Organismus. Theil VIII. Beiträge zur Kentniss der Terpentinölwirkung. *Arch. f. Hyg.*, Bd. XXXIV., Hft. 4, 1899, p. 321.

Experimental studies on the influence of gases and vapours of technical and hygienic importance on the organism. Part VIII. Contribution to the knowledge of the action of turpentine oil.

——— Experimentelle Untersuchungen über die Wirkung technisch und hygienisch wichtiger Gase. Thiel IX. Untersuchungen über die langdauernde Wirkung mittlerer Kohlensäuredosen auf den Menschen. *Arch. f. Hyg.*, Bd. XXXIV., Hft. 4, 1899, p. 335.

Experimental investigations on the action of gases of technical and hygienic importance. Part IX. Investigations on the prolonged action of moderate doses of carbonic acid on man.

STOCKMAN, RALPH, M.D. On the Cause of so-called Phosphorous Necrosis of the Jaw in Match-workers. *British Medical Journal*, 7th January, 1899, p. 9.

The paper deals with the symptoms, pathology, treatment, and prophylaxis of phosphorous necrosis. As regards its pathology, arguments are brought forward to prove that the cause of the disease is tubercular bacilli acting upon a jaw, the nutrition of which has been weakened by phosphorus fumes gaining access through decayed teeth.

COLIN, Dr. LÉON. La Tuberculose dans l'Armée. *Annales d'Hygiene Publique*, April, 1899, p. 309.

Deals with the hygiene of barracks, including the question of alcoholism; and emphasises the importance of attention, as in the case of typhoid fever, to the hygiene of the towns in which the barracks are situate.

SPALDING & CROSS, Messrs. L.C.C. Model Dwellings for the Millbank Site: Description, plans, and elevations. *The Builder*, 6th May, 1899, p. 446.

Description of the design and construction.

FOSBROKE, G. H., M.R.C.S., D.P.H. Typhoid at Oldbury: Report to Worcestershire County Council. *The Surveyor*, 21st April, 1899, p. 515.

Generally as to sanitary condition of Oldbury. The water supply. Milk supply. Sewerage. House drains. Excrement disposal. Hospital accommodation. Measures to be adopted for improvement.

LONDON COUNTY COUNCIL. London By-Laws as to the Drainage of Buildings, and Editor's notes thereon. *The Builder*, 1st April, 1899, pp. 313 & 317, and 27th May, p. 522.

Report of Public Health Committee chiefly in reference to sizes of drains, ventilating pipes, concrete casing to drains, iron drains, &c. (See also *The Builder* for April, 1st and May 6th.)

POORE, G. V., M.D., F.R.C.P. Aspect and Soil in relation to the Dwelling House. Read at the Architectural Association. *The Builder*, 20th May, 1899, p. 492.

Overcrowding produces disease; houses with ample sunlight and air in and around them are desirable: the erection of detached and isolated houses should be encouraged by sanitary authorities.

BUILDER, THE. Phœnix Fire-resisting Plates. 25th March, p. 301.

A report of a fire test of some plates composed of pumice, slag-sand, lime, tan, and plaster of paris. These plates are said to be used in Holland for ceilings and walls.

Building Materials, Construction, and Machinery.

HATT, Prof. W. K. Methods of Testing Paving Brick. *Engineering Record*, 4th March, 1899, p. 303.

Absorption test. Cross breaking. Crushing. Testing by "rattler," the most complete and satisfactory system.

Water Supply, Sewerage and Refuse Disposal.

FUERTES, JAMES H., M.Am.Soc.C.E. Water Softening at Southampton. *Engineering Record*, 4th February, 1899, p. 203.

Detailed description of water softening plant at Southampton (illustrated).

PRUYN, FRANCIS L. Water Consumption in Greater New York. *Engineering Record*, 11th March, p. 323.

Data and diagrams showing the consumption of water increasing at a greater rate than the population—due to waste. Necessity for control.

WATSON, JAMES, M.Inst.C.E. Rate per head of Water Supply. *Engineering*, June 16th, 1899, p. 795.

Importance of "rate per head per day" in designing new schemes. Causes which increase or diminish rate per head per day in different towns. Inspection. Waste, &c.

Coleman, T. E. Iron Construction in Drainage Work. *Building News*, 31st March, 1899, pp. 433–4; 7th April, 1899, pp. 467–8.

Water-closet fittings. Different classes of closets. Forms of joints. Baths and lavatories.

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A general description of the sewerage scheme of Walton and Felixstowe. The outfall tanks.

Bunting, T. F. Sewer Ventilation: Report to Maidstone Town Council. *The Surveyor*, 31st March, 1899, pp. 418–19.

Statements as to sewer ventilation in twenty-two towns, with special reference to ventilation by upright shafts, open manhole covers, &c.

Flower, T. J. Moss, Assoc.M.I.C.E., F.G.S. Description of the Portishead Sewerage Scheme. *The Builder*, 29th April, 1899, p. 419.

Fuertes, James H. Sewage Disposal, Kingston-on-Thames. *Engineering Record*, 8th April, 1899, p. 425.

Description, illustrated, of A.B.C. process at Kingston.

Havell, C. G., M.D. Some Aspects of Rural Sanitation. *The Surveyor*, May 26th, 1899, p. 688.

Introduction. Death rates. Sewerage and water supply. Defective construction. Treatment of rural districts.

Wentworth-Shields, F. New Sewage Tank and Filter, Illustrated. *The Builder*, 18th March, 1899, p. 283.

A description of what is called a "new tank and filter for the bacterial purification of sewage."

Woodhead, G. Sims, M.D. Sewage Sludge Disposal. *Engineering*, June 16th, 1899, p. 795.

Proportion of sewage matter in suspension. Nature's dealing with organic matter. Successful methods those in which nature's processes have been adopted. The disintegration and septic tanks.

BUILDER, THE. The Collection and Disposal of Refuse and Sewage. *The Builder*, 18th March, 1899, p. 279.

This is one of a series of unsigned articles for students on "Architectural Hygiene." In it are shown briefly the various methods in use, explained by illustrations.

HUEPPE, FERDINAND. Zur Kenntniss der Abwässer von Zuckerfabriken. *Arch. f. Hyg.*, Bd. XXXV., Hft. 1, 1899, p. 19.

On effluents from sugar factories.

Heating, Lighting, and Ventilating.

HAYWARD, Dr. JOHN W. Natural Ventilation. *Building News*, 21st April, 1899, p. 558.

Position of inlets and outlets for air in hospitals. General rules to be observed in hospital ventilation.

MONROE, WILLIAM S. Modern Practice in Steam Heating and Ventilating. *Engineering Record*, 15th April, 1899, p. 455.

Introductory remarks. (To be continued).

Personal and Domestic Hygiene.

CURY, Dr. H. Hygiène Sociale de la Grossesse. *Annales d'Hygiène Publique*, May, 1899, p. 402.

An earnest plea for ante-natal hygiene. A municipal hospital (Asile Michelet) was opened in 1893 in Paris for the treatment and care of pregnant women. During 1895 1,606 women were admitted for a total of 37,070 days.

ANON. La Consommation Comparative des peuples dans l'alimentation publique. *Annales d'Hygiène Publique*, May, 1899, p. 477.

Contains a valuable tabular statement of the amount per head consumed of different kinds of food in various countries.

BALLARD, M. Composition et Valeur Alimentaire des Fromages. *Annales d'Hygiène Publique*, April, 1899, p. 189.

Gives the exact composition of a large number of well-known cheeses.

LEHMANN, Dr. K. B. Ueber die Herstellung von Rahm und Butter frei von gesundheitsschädlichen Organismen. *Arch. f. Hyg.*, Bd. XXXIV., Hft. 4, 1899, p. 261.

On the production of cream and milk free from organisms deleterious to health.

MEETINGS HELD.

CONFERENCE ON RIVERS POLLUTION.

Tuesday, February 14th, 1899, at 4.30 p.m.

A CONFERENCE on the subject of Rivers Pollution and the Protection of Water Supplies was held, under the auspices of the Sanitary Institute, at the Parkes Museum on Tuesday afternoon. The chair was taken by Sir Francis Sharp Powell, Bart., M.P., Vice-President of the Institute, and there was a very representative meeting. Among those present were Sir John Dorrington, M.P., Mr. Hobhouse, M.P., Sir John Hibbert, Chairman Lancashire County Council, and Dr. Sergeant, the Medical Officer; Mr. Milnes Gaskell and Dr. MacLean Wilson, West Riding Rivers Board; Mr. R. A. Tatton, Chief Inspector Mersey and Irwell Rivers Board; Mr. W. Naylor, Chief Inspector of the Ribble Joint Committee; Mr. Willis Bund, Worcestershire County Council; Major Lamorock Flower, Lee Conservancy Board; Dr. H. E. Armstrong, Medical Officer, Newcastle-on-Tyne; Mr. Wynter Blyth, Medical Officer, Marylebone; Dr. G. Reid, Stafford County Council; Dr. Thresh, Essex County Council, and other medical officers and engineers especially interested in the subject.

The following Resolutions were passed:—

Proposed by Dr. C. CHILDS (London); seconded by Dr. E. SERGEANT (M.O.H. Lancashire County Council):

1. "That, for the purpose of inspection and of taking samples for examination, the officers of Local Sanitary Authorities and County Councils shall have free access to any land and premises from or through which water is supplied for domestic purposes to the public in their districts. That the officers of Sanitary Authorities and County Councils shall cause to be made thorough and regular inspection and examination of such water as often as may be deemed sufficient, and that the results of such inspections and examinations be regularly recorded and reported to the respective Sanitary Authorities and County Councils, and also to the authority mentioned in Resolution No. 4."

Proposed by Dr. G. REID (M.O.H. Staffordshire County Council); seconded by Dr. J. C. THRESH (M.O.H. Essex County Council):

2. "That the Water Authority shall cause to be made, by a competent person, regular inspections and examinations of the water supplied by them, so often as may be considered necessary, and shall record and communicate to the Authorities concerned a report of all such examinations."

Proposed by Mr. A. WYNTER BLYTH (M.O.H. Marylebone); seconded by Lieut-Col. JONES (Aldershot):

3. "That wilful or negligent pollution of any water supply shall be regarded and treated as a penal offence."

Proposed by Major LAMOROCK FLOWER (Sanitary Engineer Lee Conservancy Board); seconded by H. HOBHOUSE, Esq., M.P. (Somerset, E.):

4. "That authorities, representative of the interests concerned, be appointed for each gathering ground or group of gathering grounds of the Kingdom, who shall have the general care and supervision of the waters within each respective watershed; shall take prompt measures to prevent any threatened pollution, and to arrest any detected pollution of any water; and shall be responsible for the due and effective administration of the laws respecting the protection of water within their districts."

Proposed by Sir JOHN T. HIBBERT (Chairman Lancashire C.C.); seconded by Sir JOHN DORRINGTON, Bart., M.P. (Tewkesbury):

5. "That the Conference approve and support the Rivers Pollution Prevention Bill, which will be introduced by Sir Francis Sharp Powell."

A copy of the Resolutions was forwarded to the Local Government Board.

ANNUAL GENERAL MEETING.

The Ordinary General Meeting was held on March 22nd. The Annual Report and Statement of Accounts for 1898 were submitted. The report, which was published in Part I. of the Journal, gives an account of the various branches of work undertaken by the Institute.

The following Officers and Members of Council were elected or re-elected:—

As Vice-Presidents.

His Grace the Archbishop of Canterbury, P.C.
His Grace the Duke of Northumberland, P.C., D.L., F.S.A.
Right Hon. Earl Fortescue.
Sir F. Abel, Bart., K.C.B., D.Sc., D.C.L., F.R.S.
Sir Henry W. Acland, Bart., K.C.B., M.D., D.C.L., F.R.S.
Sir W. Guyer Hunter, K.C.M.G., M.D., Q.H.S., LL.D., F.R.C.P.
Sir Francis Sharp Powell, Bart., M.P.
Sir Thomas Salt, M.A., D.L., J.P.
Sir Henry Tho... s.
Prof. W. H. Co...)xon., F.R.C.P.
A. Waterhouse, R.A ... .B.A.

As ... Council.

P. Boobbyer, M.B., M.I ...
W. Collingridge, M.A ... LL.B.
T. W. Cutler, F.R.I.B.A.
... emon, M.Inst.C.E., F.R.I.B.A.
... Newsholme, M.D., F.R.C.P.
... is C. Parkes, M.D., D.P.H.
... D. Searles Wood, F.R.I.B.A.
J. E. Willcox, Assoc.M.Inst.C.E.

As Treasurer.

Prof. W. H. Corfield, M.A., M.D.Oxon., F.R.C.P.

As Auditors.

W. Collingridge, M.A., M.D., D.P.H.
Alfred Lass, Wood & Co.

The following Resolution was passed:—

"That this Meeting fully approve of the action taken by the Council in accordance with the powers conferred upon them by Article 50A in appointing H.R.H. The Duke of Cambridge to hold the office of President for another year, and that the best thanks of the Institute are due and hereby presented to H.R.H. The Duke of Cambridge for having presided over the affairs of the Institute, and for the assistance given to its work."

ALTERATIONS RECENTLY MADE IN THE ARTICLES OF ASSOCIATION.

At an Extraordinary General Meeting of the Members, held 22nd of March, 1899, the following Special Resolutions were duly passed, and at a subsequent Extraordinary General Meeting of the Members, held 10th of April, 1899, the following alterations and additions to the Articles of Association were made:—

Clause 2 of the Articles of Association is repealed, and in lieu thereof the following Clause added:—

2. For the purposes of registration the number of Members of the Institute is declared to be One Thousand. But the Council may register an increase in the number of Members whenever they think fit.

Sub-Clause (*a*) of Clause 11 of the Articles of Association is repealed, and in lieu thereof the following Sub-Clause added:—

(*a*) Any person who on his being elected as an Ordinary Member under Clause 7, or on his becoming a Fellow or Ordinary Member under Clause 3 or Clause 4 (not being a person within the exemption of Clauses 5 and 6), shall either be:

i. A Public Officer whose duties are connected with Public Health;

ii. A Holder of a Certificate of Sanitary Knowledge from some examining body, the sufficiency of which Certificate shall be recognised by the Council;

iii. A person residing abroad during the period of such residence;

shall, on his election as, or on his becoming a Member as aforesaid, forthwith become liable to and pay by way of subscription or contribution to the funds of the Institute for the year in which he is so elected or becomes a Member the sum of £1 1s., and for each succeeding year during his Membership shall pay on the 1st of January of such succeeding year by way of annual subscription or contribution as aforesaid the like sum of £1 1s., and shall be exempt from the payment of any entrance fee.

Sub-Clause (*a*) of Clause 18 of the Articles of Association is repealed, and in lieu thereof the following Sub-Clause added :—

(*a*) Every person who shall become an Associate under Clause 16, and who shall not be among those exempted by such Clause, from any liability to make any payment to the Institute, and every person who shall be elected an Associate, and who shall also at the time of his election either have received a Certificate of Sanitary Knowledge from some examining body, the sufficiency of which Certificate shall be recognised by the Council, or have held the appointment of Inspector of Nuisances in any district at the date of the incorporation of the Institute shall on his becoming or being elected Associate pay by way of subscription for the year of his election the sum of 10s. 6d., and thenceforth on the 1st day of January of every year succeeding his election, by way of annual subscription for such year the like sum of 10s. 6d., and shall be exempt from the payment of any entrance fee.

The following Clause is added to the Articles of Association :—

20*a*. Should any requisition signed by not less than twenty Members or Associates be transmitted to the Council requiring that any Associate be expelled from the Institute, and stating the reasons or grounds on which such requisition is made, the Council shall, in case the reasons or grounds stated by the requisitionists shall appear to the Council to afford a good and sufficient *primâ facie* cause for the expulsion of such Associate, cause to be forwarded a letter signed by the Secretary and addressed to the Associate whose expulsion is required, and take all such other steps as they shall deem requisite for giving him a fair opportunity of denial, defence, or explanation; and in case the Associate in question shall decline or neglect to avail himself of such opportunity, or shall fail to satisfy the Council by his denial, defence, or explanation, the Council shall have power at a meeting of the Council called for the purpose of considering such expulsion, and consisting of not less than ten Members of Council (one of whom shall be the President, or one of the Vice-Presidents, or the Chairman of the Council), to remove the name of such Associate from the list, and thereupon he shall cease to be an Associate of the Institute.

Clause 23 of the Articles of Association is repealed, and in lieu thereof the following Clause added :—

23. Any Member whose subscription to the funds of the Institute for the year previous to any then current year, and for such current year, shall not have been paid on or before the 1st of March in such current year, shall be liable to have his name erased from the Register of Members, on the ground of non-payment of subscriptions; and if

upon notice on behalf of the Institute given to such Member, requiring him to pay his subscriptions in arrear as aforesaid, he shall fail to pay the same according to the exigency of such notice, his name may, by resolution of the Council, be erased from the Register of Members, and if his name be so erased, such Member shall thereupon cease to be a Member. Provided always that a Member, who shall so cease to be a Member, shall nevertheless remain liable to pay the contributions, for the non-payment whereof his name shall have been erased from the list of Members as aforesaid. And provided further that, notwithstanding that the Membership of any Member may have become determined as aforesaid, the Council shall in any case in which they may think fit in their discretion so to do, have power by resolution to reinstate any such Member in his Membership upon his payment of all arrears of subscription, and he shall in such case and upon payment of arrears be reinstated as a Member accordingly.

Clause 38 of the Articles of Association is repealed, and in lieu thereof the following Clause added :—

38. In order to constitute a Quorum at a General Meeting there shall be present at least six Members.

SESSIONAL MEETING.

A meeting was held on April 12th, when a discussion was opened by Miss Alice Ravenhill on "Practical Hygiene Teaching in Elementary Schools." Rev. T. W. Sharp, C.B., in the Chair. About 64 Members, Associates, and Visitors attended (see p. 238).

Since the holding of this meeting the Council have prepared a Memorial to forward to the Education Department, urging that much greater emphasis should be laid on the study and practice of Hygiene and its application to life in elementary schools.

DINNER OF THE INSTITUTE.

The DINNER of the Institute was held at the Whitehall Rooms, on Tuesday, 2nd May, 1899, H.R.H. the DUKE OF CAMBRIDGE, K.G., President of the Institute, presided; there were over one hundred present.

H.R.H. The CHAIRMAN said: As President of the Institute, and the Chairman on this occasion, it becomes my duty to propose to you the several toasts which we are going to honour this evening. The first, of course, is the toast of Her Majesty the Queen, and I know it is a toast which requires no comment. But I think this a proper opportunity of bringing to your notice the fact that Her Majesty will this year attain her eightieth year. We feel more than ever anxious that her reign may be still continued, it has been a most prosperous reign; it has been a reign in which everything that is most interesting has advanced to an extent which nobody in former days could have thought possible, and among other things, we have this Institution, which has been organised in Her Majesty's reign, which I trust will, among the other improvements—great improvements—that have happened during her reign, be of the greatest possible benefit to future generations. I give you the health, with all honour, to Her Majesty the Queen.

Sir FRANCIS SHARP POWELL, Bart, M.P.: May it please your Royal Highness and gentlemen, I have the honour of being entrusted with the toast, which although inferior to the last toast, which always must be superior on every occasion when loyal subjects meet in this country, is still one of paramount and almost governing importance. The toast I have to propose is "The Prince and Princess of Wales and the other members of the Royal Family." I am quite sure that the feeling which prevails most in our minds at this moment is a sense of congratulation on seeing your Royal Highness once more amongst us in fulness and vigour of power, refreshed, no doubt, by the advantage, not accorded to all of us, of having enjoyed the bright Mediterranean sun during the last few dreary weeks. I can assure your Royal Highness that your return will give great satisfaction to Her Majesty's subjects, because they know that your return is not a return to inactivity, but to activity and labour; and they do not doubt that in the course of the next few months, as in the course of a long series of preceding years, your name will be found occupying a distinguished position, and a position of eminent value, wherever good service is being rendered to the country, and wherever good work is being done. It is not in every country that those who rise, sir, to propose the health of the Royal House, and who propose to compliment that House, can pay it as Englishmen

can. We do it in England with a sense of pride, and I am quite sure that whatever be the assembly which it may be the privilege of a public man to address, he cannot strike a note with more certainty of success in his utterance than when he speaks a word in honour of the Royal Family of England. If we direct attention to the Prince of Wales, we must recognise in that illustrious personage a man who has shown throughout his whole life the most consummate tact, a man who has been equal to the occasion, and who has risen to it however difficult the occasion may have been. He has exhibited on every occasion of his public appearance the dignity worthy of the Heir to the Throne of this country, and at the same time he always manifests that geniality and affability which wins the hearts of all men. Next in order—if I may venture to use the word order in such a case—comes the Duke of Coburg. I regret, and I believe we all regret, that he has ceased to be a British subject. I regret, and I believe all share in the same regret, that he will no longer lead our Navy, if occasion arises; but I myself do feel great joy in the thought that he being a German will do much to bring about that cordiality and that alliance between the German Empire and the British people, which must do so much to advance the progress of civilisation, and of all mankind. But if we have lost the Duke of Coburg we have retained the Duke of Connaught. It is not for me to sit in judgment on his Royal Highness, but I think it would be ill-becoming in me, as charged with such a toast, not to refer to the fact that he was one of the earliest Englishmen, and the Duchess of Connaught was, I believe, the first Englishwoman, who visited Khartoum after that most brilliant campaign. I believe myself that the visit of the Duke and Duchess of Connaught to Khartoum must make a great impression on those wild races of the East, and I do rejoice that no dread of fatigue, no desire for repose, prevented their Royal Highnesses from undertaking and with success, that historic journey. But, sir, that which is more to the point this evening is not so much what the members of the Royal Family have done in their exalted sphere, as the services which they have rendered to the work that this institution has at heart. H.R.H. the Prince of Wales was President of the Health Exhibition in 1883, and was also President, as most of us remember, at the International Congress in 1891. The Duke of Coburg was President of the Medical and Sanitary Exhibition organised by the Parkes Museum in 1891; the Duke of Albany was President of the Parkes Museum, and presided at the opening of the premises which are now in existence in Margaret Street; and although we have occasion to mourn the death of the Duke of Albany, we do rejoice in the friendly co-operation of the Duchess of Albany. She is often present at our meetings and takes part in our gatherings; and on every occasion she shows the closest sympathy with our work—a work which is stimulated by a knowledge of the subject, and is guided by lessons of dear-bought experience. Sir, I think I may venture to say that the Royal House to which you belong have exhibited to Her Majesty's subjects a bright example; they have

shown by their deeds that they regard a high station as involving high duties, and they think that they are right in thinking that the fulfilment of those duties is the best distinction which any human being can attain. I have great pleasure, your Royal Highness, in having the honour of proposing this toast, which I do with the utmost sincerity, and once more I beg to welcome you on behalf of our Society, and to thank you once again for the services you have rendered, not only to the country, but also to ourselves.

H.R.H. The Duke of Cambridge, K.G., in reply, said: Sir Francis Powell and gentlemen, In the name of the Royal Family, T.R.H. the Prince and Princess of Wales, the other Members and my own, I thank you for the high compliment you have paid us in drinking our health, and for the very amiable manner in which this toast has been brought to your notice. The Members of the Royal Family, in this country particularly, have certain duties to perform. First of all, they have the advantage of being well supported by the public at large. The public appreciates their presence wherever they go, and I think I may say—and I am glad to say so—that that appreciation is fairly responded to by the various members of my family. As to myself, I have been a public servant for a great many years. I have for nearly forty years been the head of the Army. I have also during that period taken a share in supporting the good and valuable institutions which exist in this country. And now, gentlemen, I am still going, and I hope you will admit that it is not every man who has attained my age who could still perform public duties. I have the idea in my mind that one ought to go on as long as one can and do some little good. I am quite prepared to undertake such duties as long as I am able, and amongst other things, I appear here this evening as your Chairman, but you must make allowance for my age. Your Chairman is not quite so lively as he was in former years. I will try to keep the standard of the Institution up as much as it is in my power. But we are rather a serious body; it is not a very lively Institution, and I do not know that I can tell you very much that is amusing. But at the same time, I could tell you a great deal that is useful about it. At all events, I can tell you that your Institution is very useful to society, and with that compliment I will conclude, thanking you for the honour you have done me, and especially my friend on my right, in proposing in such a very kindly way my health this evening.

Sir Alexander Binnie: Your Royal Highness and gentlemen, I rise to propose a toast—"The Naval and Military Forces of the Empire"—and it is one which is always received among Englishmen with acclamation. We are in the habit, I think, of forming our opinions of her Majesty's forces from the reviews at Aldershot and in the Park as regards the Army and the Volunteers; and from reviews at Spithead with regard to the Navy. But I think that none can thoroughly appreciate these great services who has not had the privilege of passing along our great eastern highway—starting from

ortsmouth or from Southampton by Gibraltar, Malta, Alexandria, ie Suez Canal, Aden, Bombay, Madras to Calcutta. What memories re associated with such a voyage. Why, it marks out in very brilliant lines the history of our Navy and our Army, and I can assure you, gentlemen, that from a voyage such as that you are forced, whether you like it or not, to appreciate the great deeds which have been done in the past. And from personal experiences I think you see the Army and Navy under such working conditions which will raise those great forces very much in your estimation. I need not speak for a moment on the *personnel* of our Army or of our Navy—they are too well known, both in the past and in recent years. This country thoroughly appreciates all the valuable services which they have and are always prepared to render to this nation. But, your Royal Highness and gentlemen, in speaking in this assembly we are always forced to consider another phase of Her Majesty's forces; we, as engineers—and I speak from some six years' experience in India—are continually brought into the most intimate relations with officers of the Army, and frequently of the Navy, and I can speak with the most heartfelt thanks for the assistance, the co-operation, and the brotherhood, which unite the officials similarly situated in Her Majesty's Indian Empire. Coming nearer home, to the great sanitary work which your Royal Highness has alluded to, we can never forget that as regards the sanitation of the Army, from those melancholy years 1854–55, you, sir, have thrown your energies into this great object, which all of us have fought for. And, sir, from the Army Sanitary Commission, which followed on that occasion, has grown that interest of the public and of military men in the proper sanitation of the Army. We have been carrying on, most of us, sanitation from its civil side, and it is a very grateful recollection that your Royal Highness has, by your persistency in this direction, always aided us to the best of your power. It is a debt we owe to you personally, and generally to the Royal Family, that they have aided the public in their desire for better and cleaner homes in every sense of the word. In proposing this toast, permit me to call upon my friend—I may say our friend—Major-General Carey, to respond.

Major-General C. P. Phipps-Carey: Your Royal Highness and gentlemen, it is my duty to respond on behalf of the Army, as my senior officer is absent without leave. Last year at your annual dinner, nearly at the same time of year, I ventured to predict that before the autumn was over my brother officer and friend, Sir Herbert Kitchener, would shatter the power of the Khalifa in the Soudan, and gain possession of Khartoum. We all know how that prediction has been fulfilled, thanks to the foresight and extraordinary energy displayed by the Commander, and the discipline of both the British and Egyptian troops under his command. This is a proof of what the British soldier can do when ably led, a brilliant sample which the nation thoroughly appreciates, as was shown by the reception which Lord Kitchener received on his return from his campaign in Egypt. As regards the sanitation of the Army, no one, sir, has

[illegible] interest in the welfare and well-being of the soldier [illegible]. The result of that interest, coupled with the efforts [illegible] of this Institution, the late Sir Douglas [illegible], has been that the health of the Army has been vastly improved, barracks have been placed in a proper state of sanitation, and [illegible] revolution has taken place compared with what was the case thirty or forty years ago. In India the [illegible] among our young officers and men [illegible] must be attacked by sanitary science, and the victory over this [illegible] when gained will not be less [illegible] than that won on the more outwardly brilliant battlefield. I [illegible] you for coupling my name with this toast.

[illegible], K.C.B., in proposing the toast of "The Houses of Parliament," said: Your Royal Highness and gentlemen, [illegible] of the Houses of Parliament is both partial and [illegible], but on the other hand there may be a novel aspect in my [illegible]. For twenty-eight years I have been a Civil Servant, and [illegible] of one who has been behind [illegible] of Parliament by reading the [illegible]. My experience lies behind the scenes, so to speak, in [illegible] and in committee rooms, and [illegible] of such experience of the great [illegible] of Parliament, those Houses [illegible] honourable to them, for in so far as the [illegible] advisers of the Government are [illegible] that whatever party has been in office, who[illegible] I never knew an instance in which political [illegible] to set aside questions and considerations [illegible] to the public health. As a mere technical [illegible], I imagine, to take the standard of that which [illegible] it is my duty to advise. It has hence been [illegible] that which is absolutely right and that which [illegible] that which is ideal. But when I come [illegible] with a Minister I find I have to deal with one who has [illegible]. He has to consider what is practicable; he [illegible] ahead of public opinion, and that his [illegible] the number of votes which he can [illegible] appear that these two positions [illegible]. But generally speaking, I can [illegible] that they can act in harmony; and I [illegible] any technical advice which it has [illegible] which has been set aside by a Minister [illegible]. On the contrary, the relations between [illegible] and members of Her Majesty's Ministry are [illegible] harmonious in character. There have been many public pronouncements to the effect that Ministers value and have confidence in their permanent and technical advisers. No one has admitted it, perhaps, more graciously than Mr. Balfour did at a recent dinner of the Civil Service. But if that be so from his point

of view, I can assure you that from the very much more humble standpoint of a technical adviser, this feeling is more than reciprocated. It is impossible for any man to occupy such a position without the conviction that he can fulfil his duty to a Minister of the Crown, whichever side is in power, in an honourable manner. My experience of this relates, of course, to the Department of Public Health, a department of comparatively modern growth, one which has no written traditions. The British constitution itself has never been written down; it is so elastic that it can take in a new department on old and well travelled lines; it cares for the wants of the community, and takes in anything for their good. As to the absolute absence of political considerations where the technical advice is concerned, you will perhaps allow me to give an instance. I have the honour to preside over a department containing a considerable number of technical advisers, and during my long tenure of office I have known many new appointments made and many vacancies filled. But I can say without the slightest risk of correction that I never knew an expert appointed to the medical department of the Local Government Board by any President of that Board in regard to which appointment the President ever asked the political views of the applicant. This must be a matter of great gratification to all; it is a thing one does not often talk about, but it is a highly prized character of our public service. And, so with regard to the two Houses which rule us, their traditions are of the best; they contain that which is most noble, most honourable in the nation, and we as Englishmen ought to feel the greatest gratification that have had handed down to us a precious heritage which preserves to us such freedom and such liberty of action. My own experience leads me to say that, from the depth of my heart, I hope the time will be far distant before anything is done to alter this great Constitution, as represented by the two Houses of Parliament; a constitution which has grown up slowly through past ages without any noise of hammer or of chisel, and which has formed itself into a great reality. So also I hope the day is far distant when any attempt will be made to introduce any great or sudden change into an institution of such immense value to Englishmen, an institution which represents that which is most honourable amongst all forms of government, which has become the one most envied by other nations. You have drunk the health of the Sovereign, and with your Royal Highness's permission I will now propose the remaining realms of the Estate—the health of the House of Lords and the House of Commons, coupling with the toast the name of Mr. Russell, under whom I have the honour to serve.

Mr. T. W. Russell, M.P., in replying, said: Your Royal Highness and gentlemen, I thank you sincerely for the manner in which you have drunk this toast, and for the kind words uttered by Sir Richard Thorne Thorne. About the House of Lords I know very little, save this, that it does its work extremely well, and talks less than the House of Commons. And I think that whatever danger may

befall the House of Lords, these two facts will stand it in good stead in any trouble it may find itself in. As regards the House of Commons, which I do know, and for which I have a very great deal of respect, I think it requires all the good wishes you can expend upon it. I think, for example, that we get more than our share of influenza. And if I may put it a little further, I think the Treasury Bench, no doubt for its sins, has a great deal more of it than any other Bench in the House, and the Sanitary Institute might do worse than devise some kind of informal investigation that would give us a somewhat better time in this respect than unfortunately we have had. The House of Commons, I think, is seen at its very best when it is engaged, not in party conflict—because it is then seen at its very worst—but when it is engaged upon questions of public health such as you are interested in and voluntarily promote. May I to-night refer briefly to two questions in which this Institute has taken some part? It will be convenient to take one question first—the housing of the poor. Now there is a very great deal being written and said about this question at the present time. I do not say that all that is said or written is extremely wise or extremely well informed, but that does not seem to matter in these days. Parliament will take care, when it comes to deal with it, to separate the chaff from the wheat. But although a Bill has gone through the Committee stage, and will very shortly proceed to Royal Assent, everyone must feel that that Bill deals with only part of a great question, and that so far as the Small Houses (Acquisition of Ownership) Bill is concerned—a most valuable Bill in itself—it cannot be said to touch the vital question which comes within the term, "housing of the poor." I do not think its author, Mr. Chamberlain, claims for it more than I have said. It is a valuable measure, exceedingly useful to thrifty people who deserve to be encouraged, but when we come to consider the condition of the overcrowded poor in our great centres of population, then something very different will be required. We have one Act upon the Statute Book, the Act of 1890—we have in fact more than one—dealing with this question, and the real difficulties that arise in the administration of that Act are twofold. First of all, when the local authority is called upon to acquire a crowded area in order that people may have breathing space, and that nests for disease may be eradicated, the first thing the local authority has to meet is the enormous cost of the operation. That is the first difficulty. I am speaking in the presence of my friend, Sir Alexander Binnie, and he knows well what that means in London, and what it means in every crowded centre of population. That drives us to one conclusion: if that Act had been ineffectively worked in the past, and if the attention of Parliament had again to be fixed on this subject, then one thing is inevitable, we must get these populations outside the crowded areas, we must get buildings erected where land is cheap. It is almost prohibitory in the centres themselves, that is, you cannot put up buildings that will pay, considering the rent people can afford to pay. You must get the people outside these crowded areas to places where land is cheap,

ere buildings can be erected on commercial principles; and I am ppy to think that the electric trams and various other means of mmunication that are now being used are making that problem ther easier of solution in most of our great towns, and I hope it ill be possible before long to face this question, clear those areas, nd give these people the breathing space which they have not now. he next question—I do not know whether it will gain your assent o readily, but I am very glad Sir Richard Thorne Thorne is here, is presence will make me very careful. He spoke evidently in fear f the presence of one of his official chiefs, but I am going to speak ith regard to the vexed question of vaccination, and I speak also ith the fear that I may be called over the coals to-morrow morning. wish to say frankly that I think a great many people in this ountry—and a great many people who ought to have known better —were exceedingly rash, and were exceedingly unjust to the Government and the House of Commons when the Vaccination Bill was passed last year. I hope you will allow me to say that, s a Member of the House of Commons and a Member of the Government. I will tell you why. I think the new Act is going to win. It is dangerous to prophesy before you know, but that is exactly what a great many people have done in regard to this matter. I say people were unjust and unfair towards the Government and the House of Commons, because they did not, I think, appreciate the whole facts of the situation. It would have been a very easy thing, gentlemen, if you had had merely to coerce and compel unwilling and reluctant parents to have their children vaccinated. But there was another fact impressed upon both the House and the Department; it was not the fact that there were unwilling parents, but the fact that many of the local authorities charged with the administration of the law refused to put it in force. Now I never got any advocate of compulsory vaccination to tell me how it was possible to compel 150 boards of guardians in the country to obedience when they said they would rather go to gaol than carry out the law. I never could get an answer to that question. I believe you cannot get an answer. It was not, I repeat, the compelling of unwilling parents which constituted the real difficulty, but the compelling 150 authorities elected by the votes of their constituents to do their duty. I say sufficient allowance was not made for that fact. I do not think sufficient allowance was made for another fact. I do not think it was taken into account, as it ought to have been taken into account, that a Royal Commission that sat for seven years (and it contained at least four names of very great reputation in the medical world) sanctioned this very point as to the conscientious objector. It is a very difficult thing for the Government, and it is a very difficult thing for Parliament, when a Royal Commission comes to a conclusion and a recommendation, to set that recommendation aside. I do not say that it would have been impossible, but that it was exceedingly difficult and became a greater difficulty still when four medical men supported it. I do not say now whether it was right or wrong, I am only pleading that

sufficient all[illegible]vance was not made for the Government or for Parliament. But the thing has been done, and I wish to say here to-night that the Vaccination Act passed by the Government had three leading features. First of all it abolished—or abolished to a very large extent—what is called stational vaccination; that is to say, the plan of the parent taking the child to a vaccination station, probably having to travel miles in some cases, and then having to go again on the eighth day to ensure that the vaccination was satisfactory, wa[illegible]t aside. That has been abolished or almost entirely abolished. [illegible]stead of that we have now got domiciliary vaccination. The effect o[illegible]hat has been very marked. The second point in the Vaccination Act is this, that instead of using the old lymph a new [illegible]ph has b[illegible]mpl[illegible]nder which no risk can possibly [illegible], and th[illegible]as c[illegible]rmous improvement upon the old system. Th[illegible] of the conscientious objector, which was and i[illegible] policy. I wish to be perfectly frank, for I think [illegible]ere things can be plainly said and appreciate[illegible]n there is something in the English people [illegible]ion, and if you force even a good thing upon [illegible]ry often revolt and won't have it. But I never d[illegible]nscientious objector was a very formidable person. [illegible]nd Sir Richard will remember it, that the careless a[illegible]nt were the real people to be secured. Now I can[illegible]s, because the period during which the Act has been w[illegible] short to justify my venturing upon figures and comparing them with the figures for other periods, though that will be done in due course. But there can be no question about this, that the careless and the indifferent are being reached under the new Act as they never were reached, and never could be reached under the old system. That is already certain, and the domiciliary visit of the public vaccinator is doing exactly what the Royal Commission and the Government expected it would. The result is in many places which I could name where vaccination had almost ceased, there are a very large number of children recently born who are being vaccinated. I know what will be said immediately. I shall be asked about the 230,000 exemption certificates issued at the courts before the 31st December? Well, those figures look very alarming, but let me place another set of figures before you. Between the years 1885 and 1898 there were something like 12,500,000 births in England and Wales; in the same period 3,235,000 were not reported as vaccinated, and the number of children not vaccinated was growing year by year. The Act was being pushed aside in place after place, and things were getting every year worse and worse. Now, there have been only 237,000 certificates granted, and those are not for children born last year, but for children of all ages not vaccinated during the last ten years, and largely taken out as exemption orders. I know the supply of lymph from the Government laboratory is not a perfect test, but the lymph is going out now to public vaccinators at the rate of 1,700 tubes a day. If this rate keeps up—and I know Sir Richard Thorne Thorne will agree

ith me that it has been increasing steadily since the 1st January, nd the tendency is still upwards instead of downwards—that means it the present time that there are between 500,000 and 600,000 children being vaccinated by the public vaccinators annually. Taking a tube per child there are 500,000 or 600,000 children being vaccinated by the public vaccinators; add to these the large number of children vaccinated by the private medical practitioner—a very large number indeed—and put the births in England and Wales at 800,000 or 900,000, and you will find that tried by that test vaccination will be much greater than last year. But that is not the only test to be applied. We have facts from various districts; one was given by a Radical, that is by one who does not sit on the Government side of the House. He said in his district there had not been 27 children vaccinated during the last ten years, but there had been 600 vaccinated since the first of January. I could name another district in which—in spite of the resistance which was said t was certain would arise—every child has been vaccinated. It would be unwise to lay stress upon the four months' experience under the new Act. But tried by any test, so far as it can be tried, by any test you like, it will be found that the new Act is working practically far better than the old. We have now all but got rid of the great difficulty which we have had with the local authorities. There have been some difficulties in regard to the appointment of vaccination officers. But the position taken up by a few local authorities was perfectly untenable. They have now secured exemption for the anti-vaccinator. They are clearly entitled and bound to supply the means for those who desire it. We have now got rid of almost the whole of this conflict with the local authorities charged with the administration of the Act. Medical men also work loyally in carrying out the Act, and I believe when the year comes to an end, my friend, Sir Richard Thorne Thorne, will be able to show a very large increase in vaccination. We were charged with exposing the country to the danger of an awful small-pox epidemic, but I believe that the real result will be a very large increase in vaccination under the new Act. All we ask is to be judged by the results, and I think all those who did make those charges against Parliament will be forced to admit that all is well that ends well. Now, I have gone somewhat into detail in this matter, because I know this is a subject of great interest to the Sanitary Institute. I thank you, gentlemen, for drinking the health of the Houses of Parliament, and I am exceedingly obliged by your attention to my remarks.

H.R.H. The Duke of Cambridge, K.G.: Gentlemen, after the very interesting speech to which you have just listened, I feel considerable difficulty in addressing myself to the next toast, because, whilst the last speaker who has just sat down has given an account of a matter with which he is thoroughly conversant, of which he knew all the details, I am bound to tell you in your business, which you practically know, I am very ignorant as to the details connected

with the subjects in which you are specially interested. Happily for me, the toast is to be replied to by my neighbour on my left, who is quite able to give you all the requirements and all the circumstances connected with this Institution, and therefore I would only detail a few points, because I feel that the detail, and in fact, the whole matter, is in much better hands with Mr. Law than in mine. But I must say this: amongst the many advances we have made in this country of late years, there is none to my mind which has been of such public advantage as the progress connected with the sanitary questions of the day. We must bear in mind that the enormous increase in population is such, that it requires new laws, new institutions, new ideas and habits, in order to meet what is now passing around us. And we must also bear in mind that in our arrangements in former days—in my early days, some sixty years ago, which few of you can recollect, few of you can remember so far back as I can—we never thought of such things. The consequence of this growth is, that we are compelled to go into details, which, in those days, were never contemplated. The population having increased, and the sanitary arrangements for houses in large towns having also increased enormously, requires very serious consideration, and not the consideration of a man like myself, who knows only superficially—though thinking I hope what is right—but in order to go into these important details properly, it requires a man who has studied the subject thoroughly from every point of view. Amongst other things, we then heard nothing about the microbe. I never was taught about the microbe: now we hear everyday of the microbe; take up any newspaper, and you will find something in it about the microbe. It did not trouble me in my early days, but I have now just an appreciation of what it means. But my friend here on my left knows all the details of this, and the many other important matters connected with sanitary science. Under these conditions, I think I shall be making matters pleasanter for you if I merely say that, individually, I believe that this Institution is one of the most valuable institutions that we could possibly have—it is a new institution created by the march of intellect and the march of events, one which ought to be supported, and which, as its President, I am proud to support. But this is a subject which I think we had better leave to the intelligence and the capacity of those members who surround me, though, while they are interested in it, at all events, I may say that they do not feel a deeper interest in its results than I do myself. But one thing I ought to tell you; it is intended to add to the institution building. The large public use of the Parkes Museum has proved it to be of such general utility, that the Council have decided to start a building fund for the purpose of providing a larger and more suitable accommodation in which to still further develope their rapidly increasing work. Well, gentlemen, I am bound to announce to you that I think it is a happy and a very wise proposal. I hope it will be supported by the members of this Society. As to the rest of the work, I think I may tell you in general terms that the membership of the Institute has largely increased in numbers:

it numbers 2,300 members and associates; the income last year, 1898, was £8,773, its capital is over £12,000. Last year it held 200 meetings, which were attended by 9,000 people, besides the 90,000 who visited the museum and exhibition. I think that it is a good result so far as it goes. I have no doubt it will go a great deal further under the wise and prudent steps that the Council take in enlarging their building, and in that direction it will be of real value and utility to the public. Gentlemen, I give you the toast of the Institute, and couple with that toast the name of Mr. Henry Law, the Chairman of the Council."

Mr. Henry Law: May it please your Royal Highness and gentlemen, in the name of the Council I desire to express our thanks to your Royal Highness for the kind manner in which you have proposed this toast, and to the company for the cordial manner in which it has been drunk. I cannot refrain from referring in the first place to the great loss that our Institute has sustained by the death of our late Chairman, Sir Douglas Galton, to whose wise counsel and active interest during the many years he was connected with it, the Institute owes so much. It is upwards of twenty-three years since the Sanitary Institute was founded, and I remember that we then met in a small upper room in Spring Gardens. During the period that has elapsed—and looking back from the present to the past—we see that the progress which the science of sanitation has made in that quarter of a century has been simply phenomenal, and, with the figures which I have in my mind, I think I may fairly claim, without fear of contradiction, that the Sanitary Institute has the merit in no inconsiderable degree of having assisted in the progress which has been accomplished. When I tell you that in the exhibitions, which we hold annually, nearly 600,000 visitors have been present, that we have held 161 examinations, for which some 6,000 persons have studied to enable them to pass, and of which 66 per cent. have passed, you will, I think, see the truth of my contention. But when I also tell you that forty-seven teaching institutions send classes to our museum for instruction, that since that practice has existed, between 600 and 700 of those classes have come to our museum, amounting to no less than 10,000 students, and that the average number of persons annually visiting our museum is 15,000, that we have courses of lectures at which a very large number of persons receive instruction, I think, in the face of these facts, that I may fairly claim that the Sanitary Institute has accomplished a very large proportion of the responsible work in connection with the advance which has been made in sanitary knowledge. This progress has not, however, been attained without very great efforts on our part. We have nine standing committees; during the last year we have held no less than 171 council and committee meetings, which some of our members have attended no less than eighty times. That fact alone will show you the extreme interest which the members of our council take in the work they have before them, and account in a very great measure for the success which has attended their efforts.

But I am very glad to have this opportunity of saying that we owe in a very great measure the progress we have made, and the position we have attained, to the indefatigable energy and marked ability of our Secretary, Mr. E. White Wallis. I need hardly delay, or weary you, by telling you in detail the various branches of the work which we are performing for the education of those interested in sanitation generally; but I cannot sit down without expressing the great obligation we are under to your Royal Highness as President of the Institute. Some years ago when we were struggling into existence, our late lamented Chairman of Council, Sir Douglas Galton, made an appeal through *The Times* newspaper, which was seen by his Royal Highness. He sent for Sir Douglas, who made him acquainted with the value of the [illegible] g done and the interests which were at stake. [illegible] nce of his Royal Highness, a meeting was he [illegible] House, which resulted in the Parkes Museum [illegible] n a firm and solid basis; but more recently w [illegible] Royal Highness for presiding over this Instit [illegible] hat all the years he has been our President we [illegible] progress. And during the last three years we h [illegible] n the record of the preceding year, and, unde [illegible] through the same exertions, I feel confident we [illegible] ering and extending our work. Gentlemen, I have to [illegible] ry much for the manner in which this toast has bee [illegible]

The proceedings, which had been agreeably interspersed with musical selections, then ended.

EXAMINATIONS.

Practical Sanitary Science.

Birmingham, April 14th & 15th,	5	Candidates,	1	Certificate	granted.
London, May 5th & 6th,	9	„	3	„	„
Belfast, June 9th & 10th,	1	„			
York, June 23rd & 24th,	1	„	1	„	„

Inspectors of Nuisances.

Birmingham, April 14th & 15th,	29	Candidates,	17	Certificates	granted
London, May 5th & 6th,	87	„	40	„	„
Belfast, June 9th & 10th,	6	„	3	„	„
York, June 23rd & 24th,	30	„	14	„	„

Examination Questions.

Practical Sanitary Science.—Birmingham, April 14th and 15th, 1899.

PAPER I.

1. Define "centre of pressure." How would you calculate it in the case of the vertical, inclined, and horizontal surfaces of a tank filled with water?

2. Explain the theory of the Porter-Clark process for the softening of water.

3. What are the relative advantages and disadvantages of residences (*a*) on hill-tops, (*b*) on flat plains or table lands, (*c*) in depressed valleys between hills, (*d*) on alluvial lands near river estuaries? Explain in each instance the possible effects upon health.

4. What source of contamination are water mains liable to on the intermittent system? Enumerate any disadvantages which may attach to the constant supply system.

PAPER II.

5. Show by a sketch how you would construct a tank of concrete, entirely above ground, to contain 135,000 gallons, the depth of water being 6 feet. State the pressure upon the bottom and side walls, and the thickness which you would make them.

6. In ventilating a room state the position of the inlets and outlets; their relative size to the number of people occupying the room; their form and shape and how protected to prevent snow and rain entering the room. Give their relative position with regard to the fireplace. What is the usual velocity of air in the shaft and throat of an ordinary chimney?

7. A detached house, with yard and stables adjoining, has to be drained; show by a plan and section a good arrangement of drains to effect this, the sketch to extend to the connection with a sewer in a road to which the house fronts.

8. Sulphate of alumina is used as a precipitant of sewage; what conditions are necessary in order that the best results may be obtained?

The Candidates were examined vivâ voce *on the* 15*th.*

Inspector of Nuisances.—Birmingham, April 14th and 15th, 1899.

1. What powers have District Councils with respect to "workshops"? What amount of cubic space for each adult employed can be insisted upon?

2. How does overcrowding affect health injuriously? What are the conditions which you would bear in mind when deciding whether there was unwholesome crowding in—

(*a*) An ordinary dwelling;
(*b*) A common lodging house;
(*c*) An infectious diseases hospital;
(*d*) An elementary school?

3. How would you equip yourself and proceed to take samples for analysis of milk and butter under the Food and Drugs Adulteration Acts? Let your description be in detail.

4. Describe in detail the general routine of an Inspector of Nuisances' daily duties. What records of your work would you consider it necessary to keep?

5. A complaint is made that a sleeping room is damp, to what special points would you direct your attention in investigating the matter?

6. What sources of supply would possibly be available in providing water for a large country house? State the advantages or disadvantages of each.

7. Do you consider a grease trap desirable generally, or only under special circumstances? State your reasons for your answer.

8. Sketch some of the water-closets in common use in houses. Name the advantages and disadvantages of each.

The Candidates were examined vivâ voce *on the* 15*th.*

Examination Questions.

Practical Sanitary Science.—London, May 5th and 6th, 1899.

Paper I.

1. Distinguish between a fluid and a liquid, gas and vapour, conduction and convection, amorphous and isomorphous. What are colloid substances?

2. Under what circumstances do the walls of a room shew condensed vapour? Why is a down draught sometimes felt when sitting against a wall or large window, although there is no opening from which it may come? What is the difference between a "Sherringham" and an "Arnot" valve, and where would they be used?

3. What effects are produced upon the drainage of the subsoil in tidal river valleys (*a*) by the construction of deep sewers; (*b*) by the rise and fall of the tide; (*c*) by the closing of shallow wells?

4. What are the advantages and disadvantages of continuous and intermittent sand filtration for the purification of water on a large scale? What evidence is there that the depth of the filter bed plays an important part in bacterial purification? Describe the best way of filling and emptying a filter bed, and of controlling the rate of filtration?

Paper II.

5. State the rules for calculating the transverse strength of beams when—

(*a*) Supported at each end with the load applied in the middle.
(*b*) Supported at each end with the load equally distributed.
(*c*) Fixed at one end with the load applied at the other.
(*d*) Fixed at one end with the load equally distributed.

6. What are the impurities (*a*) gaseous, (*b*) solid suspended, to be found in the air of inhabited dwellings? How can you determine the presence of these impurities in air?

7. What is a self-cleansing drain? State what gradients must be given to 6-inch, 9-inch, and 12-inch drains respectively, to make them self-cleansing; and under what conditions the velocity and the discharge will be greatest. If a 6-inch sewer laid with a gradient of 1 in 70 gives a velocity of 3 feet per second, what will be the velocity when the sewer is laid with a gradient of 1 in 280.

8. State if any of the following matters can be dealt with under the powers possessed by Sanitary Authorities. If so, how?—

(*a*) The chimney of a wash-house connected with a private dwelling emitting black smoke.
(*b*) The crowing of cocks disturbing a neighbour.
(*c*) A complaint made respecting the smell of frying fish in a fried fish shop.
(*d*) A person seen to throw offal from a window on to a public road.

(e) A rain-water pipe discharging on to the pavement in an urban district.
(f) A public-house without lavatory accommodation for the customers.

The Candidates were examined vivâ voce *on the 6th.*

Inspector of Nuisances.—London, May 5th and 6th, 1899.

1. What are the definitions of "butter" and of "margarine" under the Margarine Act, 1887? What are the chief provisions of this Act?

2. What sanitary circumstances should be noted by an Inspector of Nuisances when making an inspection of a row of workmen's dwellings built prior to the passing of the Public Health Act, 1875? What sanitary defects would you expect to find in such a row of houses in a rural district?

3. Owing to a water famine, a constant supply has to be interrupted. State the precautions that require to be observed under the circumstances.

4. You find upon the premises of a pork butcher a half of the carcase of a pig, which in your opinion appears to be unfit for human food. Give in detail your procedure in such a case.

5. Contrast and explain the relative values of dry heat, superheated steam, and saturated steam, for disinfecting bedding and clothing. State the temperature and time of exposure necessary in each case.

6. What steps would you take so as to prevent the spread of an outbreak of typhoid fever in a rural village that derives its water entirely from wells, and where cesspools are common?

7. What are the advantages and disadvantages of trough closets for use in courts occupied by the poorest class of tenants? What system must be pursued to keep them in good sanitary condition?

8. What is a soil-pipe? Describe with sketch the fixing and jointing of an iron soil-pipe outside a house and the connections of the water-closet branches.

The Candidates were examined vivâ voce *on the 6th.*

Examination Questions.

Practical Sanitary Science.—Belfast, June 9th and 10th, 1899.

Paper I.

1. What is the law of the diffusion of gases? What are the relative ventilating capacities of two pipes, 3 and 4 inches diameter respectively and of equal length? Which is the heavier, dry or moist air?

2. Calculate the area of the surface (including the base) of a cone of the following dimensions: diameter of base, 15 inches; length of side, 21 inches.

3. What precautions should be taken to secure healthy conditions, as far as possible, in erecting huts for temporary accommodation upon marshy or boggy land?

4. What are the chief points to be considered in the selection of a gathering ground for water supply?

Paper II.

5. Describe, and illustrate by sketches to a scale of $1\frac{1}{2}$ feet to 1 inch, each of the following—

English bond in brickwork.
Flemish bond in brickwork.
Ashlar-faced rubble stone wall.
Ashlar-faced brick wall.

Show clearly *how* the bond is formed and state the comparative merits of each.

6 Describe, with sketches, a system of ventilation for the propulsion of pure air into the rooms of a building. Describe a suitable method for warming such air in cold weather. What are the advantages and disadvantages of this system of ventilation.

7 What constitutes the essential difference between a disconnecting trap, placed on the line of a drain, and any other trap? Illustrate your answer by sketches.

8. What are the provisions of the Public Health Acts with reference to the letting of infected lodgings?

The Candidates were examined vivâ voce *on the 10th.*

Inspector of Nuisances.—Belfast, June 9th and 10th, 1899.

1. What powers have Rural District Councils to compel owners of dwellings to provide water supplies? And what would you consider reasonable distances from dwellings to such water supplies?

2. Why are streams in inhabited districts unsuitable sources of supply? What precautions should be taken to safeguard streams from pollution?

3. What are the appearances of liver fluke in a sheep's carcase? Is the meat unfit for food?

4. What legal power has a sanitary authority to prevent the spread of infection, by means of (*a*) the person suffering from an infectious disease; (*b*) his clothing; and (*c*) milk at a dairy where such disease is prevalent? What is the duty of an Inspector of Nuisances in each of the foregoing cases?

5. Give full instructions for the disinfecting of typhoid excreta. What agents may be safely employed for this purpose?

6. What nuisances are likely to arise where a water-closet is used in common by the occupants of several houses? How may they be prevented?

7. Describe what steps you would take to ascertain whether a private dwelling-house is overcrowded, and state what points would influence you in deciding as to overcrowding in different kinds of dwellings.

8. Describe, with sketches, a suitable water-closet for use by the working classes. Where should it be placed, and how connected with the house drain?

The Candidates were examined vivâ voce *on the* 10*th.*

Examination Questions.

Practical Sanitary Science.—York, June 23rd aud 24th, 1899.

Paper I.

1. What are the natural sources of heat? What is the difference between heat and temperature? What is meant by absolute zero?

2. What precautions should be taken with regard to the preparation of a site for a house on

(*a*) Wet clay soil?
(*b*) Sandy soil with springs?
(*c*) In a Fenn?

3. What is the nature of the impurities which may be met with in waters collected from the following sources:—

(*a*) Deep well in the chalk?
(*b*) Shallow well in the clay?
(*c*) Upland surface water?
(*d*) River water?
(*e*) Stored rain water.

4. Draw a plan to scale of 4 ft. to 1 inch, and a cross section to one-eighth real size, of a fireproof floor, with figured dimensions of the mode of construction, the size of the floor to be 20 ft. by 15 ft.

Paper II.

5. How should the dimensions of windows be related to the size of rooms? To what extent does the daylight illumination vary with the angle from the horizon?

6. How many persons may be employed in a workshop of a cubic capacity of 5,000 cubic feet in order that there shall not be "overcrowding"? How may such a room be adequately ventilated.

7. Give an elevation to scale of a soil pipe from three water-closets, one above the other, and state how you deal with the wastes from bath, draw-off sink, and slop sink.

8. What are the dangers to be met with in the Woollen trade? Frame a code of bye-laws applicable to this branch of industry.

The Candidates were examined vivâ voce *on the 24th.*

Inspector of Nuisances.—York, June 23rd and 24th, 1899.

1. What, in your opinion, are the requirements of a sanitary cow-shed? Indicate the nature of the nuisances and sanitary defects most usually met with in cow-sheds.

2. What precautions should be taken to protect water from pollution inside domestic buildings?

3. Ascertain the cubical contents of a building 124 ft. long, 34 ft. wide, 62 ft. high from the foundation to eaves, covered with a span roof of 45° pitch, with gables at each end.

4. Describe and contrast the naked-eye appearances of flesh affected with tuberculosis, cysticercus bovis, and trichina spiralis.

5. What simple precautions would you advise in the event of a sudden outbreak of typhoid fever in a country village when the water supply is derived from shallow wells?

6. Give full directions for treating a bedroom and its contents in order to free it from vermin, the occupants having been dealt with under the Cleansing of Persons Act.

7. Sketch to a large scale—

Bath trap and waste,
Slop sink with trap,
Section of a 50-gallon automatic flushing tank,

and mark the dimensions on each.

8. What is the nature of the clerical work usually performed by an Inspector of Nuisances.

The Candidates were examined vivâ voce *on the 24th.*

CANDIDATES WHO HAVE RECEIVED CERTIFICATES IN PRACTICAL SANITARY SCIENCE.

April to June, 1899.

1899, June 24. Ainley, Edwin, Lower Park, Berry Brow, Huddersfield.

1899, May 6. Barker, Charles, Erindale, Ethelbert Rd., Bromley, Kent.

1899, May 6. Browning, Egbert George, 81, Vallance Road, Bethnal Green, E.
1899, May 6. Dunk, John de Lanoy, 92, Cheriton Road, Folkestone.
1899, Apr. 15. Taylor, George Sylvester, 3, Augusta Road, Moseley, Birmingham.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES AS [illegible] NUISANCES.

Und[illegible]lth Act, 1875.

[illegible]e, 1899.

1899, Apr. 15. A[illegible]ward, 2, Albert Street, West [illegible]
1899, June 24. A[illegible] Henry, 23, Ossington Street, [illegible]
1899, June 24. A[illegible]odworth, 39, Baines Street, [illegible]lifax.
1899, June 24. A[illegible]ry, Springville, Hessle, East Yorks.
1899, May 6. Awcock, Benjamin, Horsted Keynes, Sussex.
1899, May 6. Bates, Edward Percy, 26, Upper Paddock Road, Bushey, Herts.
1899, Apr. 15. Baylis, Sydney, 44, Chattaway Street, Nechells, Birmingham.
1899, Apr. 15. Bioletti, Frank Roberts, 116, Moseley Road, Birmingham.
1899, May 6. Boddy, John Read, 32, Orchard Street, Norwich.
1899, Apr. 15. Brayshaw, George Herbert, 2, St. Margaret's Terrace, Bradford.
1899, June 24. *L* Buckoll, Miss Sophie Anna, 17, Chaucer Street, Nottingham.
1899, May 6. Bullock, Burnett, 1, Romeo Villas, London Road, Mitcham.
1899, May 6. Burbidge, Alfred, Ferndale, Beechwood Road, Caterham Valley.
1899, May 6. Butler, John, 55, Cavendish Road, Aldershot.
1899, May 6. Carter, George, Albert Road, Romford.
1899, June 24. Cawood, Charles, Whixley, near York.
1899, June 24. Child, William Wilson, 69, Bishopthorpe Road, York.
1899, June 24. Christie, James, 3, Fern Dale, Sherburn St., Hull.
1899, May 6. *L* Church, Miss Gertrude Elizabeth Mary, 32, St Thomas's Mansions, Westminster Bridge.

1899, May 6. CLIFFORD, FRANK WILLIAM, 104, Richmond Road, Westbourne Park, W.
1899, June 19. CRIGHTON, ALEXANDER MUIR, Sandon, 43, Bachelor's Walk, Lisburn.
1899, May 6. DAVIS, ALBERT JOHN, 53, Granville Road, Hornsey Rise, N.
1899, Apr. 15. DYSON, JOHN, 264, Oldham Road, Middleton.
1899, May 6. FITCH, ARTHUR JOSEPH JEFFERYS, 11, Uamvar St., South Bromley, E.
1899, May 6. FOREMAN, ALBERT JOHN, 25, Church Road, Upper Norwood, S.E.
1899, Apr. 15. FRANKLIN, EDWARD JAMES, 18, Victoria Street, Fairview, Cheltenham.
1899, May 6. GAIN, ALFRED, 1st Battalion Welsh Regiment, Aldershot.
1899, Apr. 15. GASKELL, JOHN WILLIAM, 335, Manchester Road, Hollinwood, Oldham.
1899, May 6. GODFREY, STEPHEN GUIAS, 24, Jury Street, Great Yarmouth.
1899, May 6. GRAVES, THOMAS, Borough Surveyor's Office, Kingston-upon-Thames.
1899, Apr. 15. GRAY, PETER, 98, Oxford Road, Bolton.
1899, May 6. *L* GREENWOOD, Mrs. FLORENCE J., 21, Connaught Road, N.
1899, Apr. 15. HART, WALTER SIDNEY, 9, Holly Grove, Summer Road, Edgbaston, Birmingham.
1899, May 6. HARVEY, EDGAR JAMES, Ventnor, Isle of Wight.
1899. June 24. *L* HEAVISIDE, Miss CATHARINE MARY, 7, Grosvenor Street, Coventry.
1899, May 6. HENDRY, ROBERT ARNSBY, 2, Suffolk Place, Arthur Road, Windsor.
1899, June 24. HUGALL, TOM NEWTON, Sherburn, York, E.R.
1899, Apr. 15. HUMPHREYS, CHARLES JOHN, 30, Shakespeare Road, Birmingham.
1899, June 19. HUNTER, JAMES GRAHAM, 4, Springvale Place, Saltcoats, N.B.
1899, May 6. JACKLING, ERNEST, Kingston, Douglas Road, Maidstone.
1899, May 6. KEAY, HARRY HOLMES, 37, Allison Road, Harringay, N.
1899. Apr. 15. KELWAY, FREDERICK WILLIAM, 8, Vineyards, Bath.
1899, May 6. *L* KNOBEL, Miss MARGARET HILDA, 32, Tavistock Square, W.
1899, May 6. KRAMM, ALBERT BERNARD, Town Hall Chambers, Torquay.
1899, June 24. LIDDLE, JONAS, Cabin Gate, Bishop Auckland, Co. Durham.
1899, June 24. MARSH, ROBERT GEORGE, 26, Elizabeth Street, South Shields.

1899, May 6. Martyn, Walter North, 55, Caversham Road, Reading.
1899, May 6. Martyn, William Hiscutt, 27, St. James Street, Brighton.
1899, June 19. McCann, William, 6, Carlisle Street, Belfast.
1899, June 24. Miller, John Edward, Holmwood, Patrington, Hull.
1899, May 6. Mitchell, Ernest George, Trewyn, Dulwich.
1899, May 6. Moody, Christopher Theophilus, 42, Castle Hill Avenue, Folkestone.
1899, May 6. Morris, William, 46, Upper Road, Plaistow, E.
1899, May 6. Munro, Daniel, 154, Albert Street, Glasgow.
1899, May 6. Newnham, Frederick, 62, Manners Road, Southsea, Portsmouth.
1899, Apr. 15. Parsons, William, 50, Plymouth Place, Leamington.
1899, Apr. 15. Purnell, Arthur Owen, 22, Archibald Road, Lozells, Birmingham.
1899, Apr. 15. Ramsey, Thomas Kellett, Market Drayton, Salop.
1899, June 24. Read, George Alfred, Health Department, Guildhall, Nottingham.
1899, May 6. Richardson, Fred, Junr., 26, Werndee Road, South Norwood, S.E.
1899, May 6. Rousell, Albert James, St. Catherine's Street, Ventnor, Isle of Wight.
1899, June 24. Sanderson, Albert Linton, 172, St. George's Road, Hull.
1899, May 6. Scowby, Henry Marmaduke, 5, Wilkinson Street, Albert Square, Clapham Road, S.W.
1899, May 6. Smeaton, William, 66, Richmond Road, N.
1899, Apr. 15. Smedley, William Robert, Heeley Road, Selly Oak, near Birmingham.
1899, May 6. Smith, Charles Philip, 2, Douglas Villas, Douglas Road, Lee, S.E.
1899, May 6. *L* Stephens, Miss Catherine Florence, 2, St. Leonards Terrace, Chelsea, S.W.
1899, Apr. 15. Stephens, Isaac, 11, St. Paul's Street East, Burton-on-Trent.
1899, May 6. Taylor, Herbert Leslie, Tye Green, Glemsford, Suffolk.
1899, May 6. Tuffee, Hugh, 50, Parrock Street, Gravesend.
1899, May 6. Wase, Willie Nelson, 9, Dalmeny Avenue, Camden Road, N.
1899, May 6. Watmore, James, Hillview, Alexandra Road, Aldershot.
1899, May 6. Wilkins, William Fawcett, 15, Almond Road, Lower Tottenham.
1899, Apr. 15. Wood, John, 86, Keighley Road, Illingworth, Halifax.

FORTHCOMING MEETINGS.

Calendar, July to October, 1899.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m., except August and September.

Special Purposes Committee	Third Monday at 5 p.m.
Finance Committee	Second Wednesday at 4.30 p.m.
Exhibition Committee	First Monday at 5 p.m.
Congress and Editing Committee	Second Monday at 5 p.m.
Museum and Library Committee	Fourth Monday at 5 p.m.
Examination Committee	As occasion requires.
Parliamentary Committee	As occasion requires.
Rivers Pollution Committee	As occasion requires.

JULY.

7 F., 8 S. — **Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Cardiff.**

28 F., 29 S. — **Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Liverpool.**

AUGUST.

29 Aug. to 2 Sep. — **The Eighteenth Congress at Southampton.** (*Programme is given in Appendix facing page* 328.)

29 Aug. to 23 Sep. — **The Eighteenth Health Exhibition at Southampton.**

SEPTEMBER.

The COURSE of LECTURES and DEMONSTRATIONS for Sanitary Officers will commence about the Third week in September. It is proposed to extend the Course so as to make it suitable for Candidates for the Practical Sanitary Science Examination, and also for the recently organised Meat Inspectors Examination.

ADDITIONAL EXAMINATIONS ARRANGED BY THE INSTITUTE.

In consequence of the increasing demands of the Sanitary Service and the new appointments being made, in which a knowledge of Hygiene is required, the Council of The Sanitary Institute have decided to extend the scope of the examining functions which they have carried on for many years.

The Examinations which appear to be specially required at the present time are (1) for Food Inspectors, as recommended by the Royal Commission on Tuberculosis, and (2) for School Teachers.

EXAMINATION FOR INSPECTORS OF MEAT AND OTHER FOODS.

The Report of the Royal Commission on Tuberculosis recommends that in future no person be permitted to act as a Meat Inspector until he has passed a qualifying Examination. The Council of The Sanitary Institute, who have for the past twenty years been holding qualifying Examinations for the office of Sanitary Inspector, have therefore decided to arrange Examinations, a syllabus for which includes the subjects set out in the Report of the Royal Commission.

Under the general Sanitary Statutes, the duties of a Meat Inspector can only be discharged by an Inspector of Nuisances, or Sanitary Inspector, and an Inspector's Certificate will be required by the Institute as a preliminary for this Examination. The Council have thought it desirable to include in the syllabus for the Examination the subjects of which a knowledge is necessary for the inspection of other articles of food besides meat, so as to cover the whole field of Food Inspection.

Proposed Places and Dates of Examinations.

London	December 8th and 9th, 1899.
Birmingham	March 30th and 31st, 1900.
London	May 4th and 5th, ,,
Liverpool	July 27th and 28th, ,,
London	December 7th and 8th, ,,

EXAMINATION IN PRACTICAL HYGIENE FOR SCHOOL TEACHERS.

Secondary as well as Elementary Schools are now beginning to appreciate the advantage of having upon their staff one or more teachers who thoroughly understand the application of the theory and practice of hygiene in school life; and the desirability of emphasising the necessity of this knowledge in the code for Elementary Schools is now being pressed upon the Education Department by memorials from several important bodies.

No Examination has hitherto been established suitable for teachers desirous of showing knowledge in this branch of their work, and the Council of The Sanitary Institute have therefore decided to arrange a thorough theoretical and practical examination which will be open to both classes of teachers and to those preparing as teachers.

Proposed Places and Dates of Examinations in 1900.

London	February 9th and 10th.
Leeds..	June 22nd and 23rd.

These two Examinations have now been arranged, and details will be published in the next Journal, or can be obtained from the offices of the Institute.

HONORARY FELLOWS, FELLOWS, MEMBERS, AND ASSOCIATES ELECTED.

From April to June, 1899.

A complete list can be had on application.)

HONORARY FELLOWS.

Reg. No.	Date of Election.	
		AUSTRIA-HUNGARY.
15	1890. June.	von Gruber, Prof. Franz Ritter, 1, *Tiefer Graben* 3, *Vienna.*
16	1890. June.	Fodor, Dr., Sandor, *Uteza* 12, *Budapest.*
23	1894. Dec.	Muller, Dr. Káláman, *Rochus Hospital*, *Budapest*, *Hungary.*
		BELGIUM.
40	1898. Nov.	Janssens Eugene, 21, *Rue du Lombard*, *Brussels.*
26	1897. July.	Kuborn, Dr. Hyacinthe, *Rue du Colard* 33, *Seraing*, *Liège*, *Belgium.*
29	1890. June.	Putzeys, Dr. Felix, *Professor of Hygiene at the University of Liège.*
		EGYPT.
30	1890. Dec.	Greene, Dr. H. R., Pasha.
		FRANCE.
31	1892. Oct.	Bechmann, M., *Ingénieur en Chef des Ponts et Chaussées ; Directeur du Service d'Assainissement de Paris ;* 9, *Place de l'Hôtel-de-Ville*, *Paris.*
2	1890. June.	Brouardel, Dr. Paul, *Prof. and Dean of the Faculty of Medicine, Paris.*
3	1890. June.	Cornil, Dr. V., *Senator*, 19, *Rue St. Guillaume*, *Paris.*
34	1894. Dec.	Masson, Louis, 22, *Avenue Parmentier*, *Paris. Ingénieur*, *Inspecteur de l'assainissement de Paris. Chef du Service de l'assainissement des habitations de Paris (since 1881).*
7	1890. June.	Vallin, Dr. Emile, *Membre de l'Academie de Medecine*, *Medecin Inspecteur de l'Armée*, 17, *Avenue Bosquet*, *Paris.*

Reg. No. Date of Election.	
	GERMANY.
[9] 1890. June.	HOBRECHT, Dr., *Engineer, Berlin.*
[10] 1890. June.	VON HOFMANN, Prof. A. W.
[11] 1890. June.	KOCH, Dr., *Director of the Hygienic Institute, Berlin.*
[13] 1890. June.	PETTENKOFER, Dr. Max Von, *Professor of Hygiene at the University of Munich.*
[14] 1890. June.	VIRCHOW, Dr. Rudolph, *Professor of Pathology, Berlin.*
	HOLLAND.
[28] 1890. June.	DE MEYER, Dr. van Overbeek, *Professor of Hygiene at the State University of Utrecht, Netherlands.*
	ITALY.
[18] 1890. June.	BETOCCHI, Comre. Alessandro, Prof., *Civil Engineer, Ministry of Public Works, Rome.*
[30] 1898. Nov.	CELLI ANGELO, *Instituto d Igiene Sperimentale, Rome.*
	JAPAN.
[37] 1895. May.	KITASATO, Dr. Med, *Tokio, Japan.*
	ROUMANIA.
[22] 1890. June.	FELIX, Dr. J., *Professor of Hygiene, Bucharest.*
	RUSSIA.
[21] 1890. June.	SUZOR, Comte de, *Architect-in-chief, Ligue de Cadets* 21, *St. Petersburg.*
	SPAIN.
[34] 1895. May.	CEREZO, Dr. Angel de Larra y, *Costanilla de los Angeles* 8, *Madrid.*
[35] 1895. May.	PACHECO, Dr. Modesto Martinez y Gutherez, *President, Spanish Society of Hygiene, Madrid.*
[36] 1895. May.	FARIA, Don Pedro Garcia, *Ingeniero Jefe, Obras Publicas Municipales, Barcelona.*
	SWITZERLAND.
[23] 1890. June.	GUILLAUME, Dr., *Director of the Federal Bureau of Statistics, Berne.*
	TURKEY.
[24] 1890. June.	ZOËROS, A., Pasha, *Professor at the School of Medicine, Director of the Bacteriological Institute, Secretary-General of the Administration of Public Medicine and Hygiene, Constantinople.*
	UNITED STATES.
[25] 1890. June.	BILLINGS, Dr. John S., *Washington, D.C.*
1890. June.	WALCOTT, Dr. Henry P., *Cambridge, Massachusetts.*

Reg. No. — Date of Election.

FELLOWS.

41 1899. May. **Baker**, Sir Benjamin, K.C.M.G., LL.D., F.R.S., M.INST. C.E., 2, *Queen's Square Place, Westminster.*

349 1899. June. **Blashill**, Thomas, F.R.I.B.A., 29, *Tavistock Square, W.C.*

353 1899. May. **Cranbrook**, Right Honble. Earl of, P.C., G.C.S.I., 2, *Cadogan Square, S.W.*

1166 1899. May. **Egerton of Tatton**, Earl, 7, *St. James' Square, S.W.*

1129 1899. May. **Farquharson**, Robert, M.D., M.P., LL.D., *Finzean Aboyne, N.B., and 2, Porchester Gardens, W.*

431 1899. May. **Farrer**, Lord, *Abinger Hall, Dorking.*

1143 1899. June. **Galsworthy**, Sir E. H., J.P., D.L., 26, *Sussex Place, Regent's Park, N.W.*

812 1899. Apr. **Pain**, Coard Squarey, ASSOC.INST.C.E., F.S.I., 14, *North John Street, Liverpool.*

411 1899. June. **Simpson**, W. J., M.D., C.M., D.P.H., 14, *Gloucester Place, Portman Square, W.*

371 1899. June. **Smith**, Percival Gordon, F.R.I.B.A., *Highfield, Stonebridge Park, Willesden.*

377 1899. June. **Stevenson**, Thomas, M.D., F.R.C.P., M.R.C.S., *Guy's Hospital, High Road, Streatham.*

344 1899. June. **Teale**, T. Pridgin, M.B., M.A., F.R.C.S., F.R.S., 38, *Cookridge Street, Leeds.*

433 1899. May. **Thring**, Right Honble. Lord, K.C.B., F.R.G.S., 5, *Queen's Gate Gardens, S.W.*

645 1899. June. **Whitaker**, William, B.A., F.R.S., F.G.S., "*Freda,*" *Campden Road, Croydon.*

MEMBERS.

* Passed Examination for Practical Sanitary Science.

‡ Passed Examination for Sanitary Inspector.

1265 1899. June. **Baker**, Frank, F.G.S., *Borough Surveyor, Middlesborough, Yorks.*

1266 1899. June. **Batchelor**, Henry Thomas, M.R.C.S., L.R.C.P.LOND., L.S.A., M.O.H., *Queenstown, Cape Colony.*

1267 1899. June. **Belcher**, George Clement, M.R.C.S., L.R.C.P., D.P.H., 80, *Dale End, Birmingham.*

1261 1899. May. **Bell**, George Joseph, ASSOC.M.INST.C.E., 16, *Portland Square, Carlisle.*

1262 1899. May. **Clarke**, Joseph J., L.R.C.P.I., L.S.A., D.P.H., M.O.H., 77, *Markhouse Road, Walthamstow.*

1273 1899. Apr. **Commin**, Frederick James, F.S.I., 7, *Bedford Circus, Exeter.*

1276 1899. Apr. **Concannon**, Thomas George Upton, *Prome, Burma.*

1287 1899. May. **Cunliffe**, Leonard D., *Juniper Hall, Dorking.*

1288 1899. May. **Cunliffe**, Mrs. Leonard, *Juniper Hall, Dorking.*

Reg. No.	Date of Election.	
1298	1899. June.	Durnford, Colonel Arthur George, *Rackenford Lodge, Weybridge.*
1283	1899. May.	Findlay, George, M.A., M.B., C.M., M.O.H., *Brailes, Warwick.*
1284	1899. May.	Galton, Lady, 12, *Chester Street, S.W., and Himbleton Manor, Droitwich.*
1289	1899. May.	Garfield, Joseph, ASSOC.M.INST.C.E., *Kilsley Penn, Wolverhampton.*
1285	1899. May.	Gascoigne, Major R. F. Trench, *Lotherton Hall, Aberford, Leeds, and Craignish Castle, Argyllshire, N.B.*
1286	1899. May.	Gascoigne, Mrs. Trench, *Lotherton Hall, Aberford, Leeds, and Craignish Castle, Argyllshire, N.B.*
1299	1899. June.	Greenshields, Norman, ASSOC.M.INST.C.E., *Deputy Superintendent, Sewers and Rivers Department, Council House, Birmingham.*
1300	1899. June.	‡Hall, George Berringer, F.G.S., *Valkyrie, Muswell Hill, N.*
1277	1899. Apr.	Hooley, Edgar Purnell, ASSOC.M.INST.C.E., *Shire Hall, Nottingham.*
1303	1899. June.	Jennings, George, *Lambeth Palace Road.*
1304	1899. June.	Jennings, Sidney, *Lambeth Palace Road.*
1302	1899. June.	Jennings, Walter, *Lambeth Palace Road.*
1290	1899. May.	King, James, M.B., C.M., M.O.H., *Urban District Council, Leigh, Lancs.*
1291	1899. May.	*‡Knewstubb, Joseph John, *Pembroke Street, Appleby.*
1305	1899. June.	Morley, John, *Lambeth Palace Road.*
1306	1899. June.	Lawson, Albert W., ASSOC.M.INST.C.E., *Municipal Offices, Rawtenstall.*
1307	1899. June.	Lewis, Frank B., ASSOC.M.INST.C.E., A.R.I.B.A., *Deputy City Engineer, Guildhall, Nottingham.*
1292	1899. May.	O'Connor, John Edward, M.B., C.M., D.P.H., M.O.H., 1, *Surrey Street, Lowestoft.*
1301	1899. June.	Parr, Francis Hill, 26, *St. Leonards Road, East Sheen, Mortlake.*
1308	1899. June.	†Reid, David I., ASSOC.M.INST.C.E., *Inverness, N.B.*
1293	1899. May.	*‡Sanderson, John, 2, *Woolaston Rd., Harringay, N.*
1278	1899. Apr.	Sergeant, Edward, L.R.C.P., M.R.C.S., M.O.H., *County Council Offices, Preston.*
1279	1899. Apr.	Simpson, James Tracy, D.P.H., L.R.C.P., M.R.C.S., *Hynance, Farnborough, Hants.*
1294	1899. May.	Smith, Edward Shrapnell, 35, *Botanic Road, Wavertree Park, Liverpool, E.*
1309	1899. June.	Walker, George Charles, Junr., M.B., CH.B.VICT., L.S.A.LOND., L.R.C.P.LOND., M.R.C.S.ENG., D.P.H.LOND., 19, *Preston Road, Southport.*
1280	1899. Apr.	Williams, Gilbert Percy, ASSOC.M.INST.C.E., 14, *Victoria Street, S.W.*

ASSOCIATES.

of
on. ‡ Passed Examination for Inspector of Nuisances.

June. ‡ADCOCK, Albert Edward, 2, *Albert Terrace, West Bromwich.*
June. ‡ANDREW, George Walter, 147, *Arbury Road, Nuneaton.*
May. ‡BLACKLER, S. S., *Totnes House, St. Margaret's Terrace, Plumstead, S.E.*
June. ‡BRAYSHAW, George Herbert, 2, *St. Margaret's Terrace, Bradford.*
May. ‡CANNELL, John Herbert, 4, *Mona Street, Liverpool.*
May. ‡CARRATT, Edwin, 7, *Albion Place, Leeds.*
Apr. ‡CHAMBERS, Sidney Harry, 4, *Devonshire Villas, Windmill Road, Hampton Hill.*
Apr. ‡COX, Henry Edwin, 3, *Remington St., City Rd., N.*
May. ‡CROSBY, James, 3, *Thurnham Street, Liverpool.*
Apr. ‡CURWEN, Miss Maud, 11, *Carburton Street, London, W.*
Apr. ‡DAVISON, John William, 33, *Aline Street, South Benwell, Newcastle-upon-Tyne.*
May. ‡DICKSON, John George, 37, *Buccleugh Street, Dumfries.*
May. ‡DOWSETT, Charles Frederick, 75, *Childers Street, Deptford.*
June. ‡DYSON, John, 264, *Oldham Road, Middleton.*
June. ‡FOREMAN, Albert John, 25, *Church Road, Upper Norwood, S.E.*
May. ‡FORSTER, John Smith, 17, *Hinton Road, Lansdowne Road, Gloucester.*
June. ‡GRAY, Peter, 98, *Oxford Grove, Victory, Bolton.*
June. ‡GREEN, Rowland, *Welshpool, Montgomery.*
May. ‡GULLETT, Henry Thomas, 6, *Branksome Road, Acre Lane, Brixton.*
May. ‡HARRIS, John Uran, 6, *Hampton Place, St. Mary Church.*
Apr. ‡HATTERSLEY, Jesse Earland, *Town Hall, Fulham.*
Apr. ‡HAWORTH, John, 40, *Tanners Terrace, Ramsbottom.*
Apr. ‡HENRY, Walter, 189, *Uxbridge Road, Shepherd's Bush, W.*
Apr. ‡HINDHAUGH, Robert William, *Laleham, Middlesex.*
Apr. ‡HODDINOTT, Edward, *Stratton, St. Margarets.*
Apr. ‡HUGHES, William Arthur, 23, *Egerton Rd., Greenwich.*
Apr. ‡HUNTLEY, Robert J., 54, *Athol Road, Sunderland.*
May. ‡JACKSON, Edwin, 19, *Wilkinson Street, Leigh.*
May. ‡KERSHAW, Mark, 133, *Duke Street, Brooks Bar, Manchester.*
Apr. ‡KING, Henry, 13, *Queen Victoria Street, Macclesfield.*

Reg. No. Date of Election.

1970 1899. June. ‡Knobel, Miss Mary Hilda, 32, *Tavistock Square, W.C.*

1948 1899. May. ‡Lang, Arthur Edward, 30, *Tottenham Street, Great Yarmouth.*

1949 1899. May. ‡Lawrence, Charles, 254, *Blackstock Road, Highbury, N.*

1966 1899. June. ‡Longdon, Charles Matthew, 110, *Cloudesley Road, Barnsbury, N.*

1950 1899. May. ‡McCaa, John, *Stirling Castle.*

1951 1899. May. ‡Mennell, Miss Christabel, 31, *Park Hill Rise, Croydon.*

1967 1899. June. ‡Mills, Alfred Thomas, 100, *Sewardstone Road, Victoria Park, N.E.*

1928 1899. Apr. ‡Nicholas, Arthur, 21, *Frederick Street, Gray's Inn, Road, W.C.*

1927 1899. Apr. ‡Penwill, Frank, *Park Vale, Cockington, Torquay.*

1929 1899. Apr. ‡Powell, William Arthur, 27, *Endymion Road, Finsbury Park, N.*

1952 1899. May. ‡Reid, Andrew L., *Market Square, Bowness, N.B.*

1953 1899. May. ‡Shapley, William Gilbert, 100, *Waller Road, New Cross, S.E.*

1932 1899. Apr. ‡Sidebottom, Philip Kershaw, *Alster Bank, Cambridge Road, Peel Causeway.*

1971 1899. June. ‡Smedley, William Robert, *Heeley Road, Selby Oak, near Birmingham.*

1930 1899. Apr. ‡Smith, Emmett, *Mytholmroyd, Yorks.*

1933 1899. Apr. ‡Smith, George, 10, *Arthur Street, Darlington.*

1968 1899. June. ‡Snowdon, John Viney, 29, *Albert Road, Tamworth.*

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1944 1899. May. ‡Stirling, James Miller, M.R.C.V.S., *Glentirran House, Kippen Station.*

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Girder Flange Bar, Vaughan, Richards & Scott's Patent; *size*, 18 inches deep with 7-in. flange; weight, 84 lbs. per foot; designed to carry a distributed load of 31 tons on supports 30 feet apart. *Leeds Steel Works, Ltd.*

Road Gully (Iron). Section, full-size, with glass front for filling with water. *Ames-Crosta Sanitary Engineering Co., Ltd.*

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*** *For publication of Societies and Institutions, &c., see under "Academies."*

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NOTES ON LEGISLATION AND LAW CASES.

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For full text of these see Law Reports, which can be referred to in the Library of the Institute.

LANDLORD AND TENANT.—*Covenant to pay all "rates, duties and assessments"—Notice by Vestry to reconstruct drain—Expenses incurred in complying with notice—Liability of lessee—Metropolis Management Act, 1855 (18 & 19 Vict. c. 120), s. 85—Metropolis Management Amendment Act, 1862 (25 & 26 Vict. c. 102), ss. 64, 96.*

The defendant, who was the lesssee of the plaintiff, covenanted to pay the rent "clear of all deductions," and also to pay and discharge all taxes, rates, duties, and assessments whatsoever, which then were,

or thereafter should become, payable for or in respect of the said premises thereby demised or any part thereof, whether parliamentary, parochial or otherwise, except the landlord's property tax. During the tenancy the drains of the demised premises became in bad order, owing to certain structural defects, and notices were served upon the premises by the vestry requiring the drains to be reconstructed in accordance with the requirements and regulations of the vestry. The necessary drainage work was carried out at a cost of £143 by the plaintiff, and the question for decision was, whether the plaintiff or the defendant was liable, on the true construction of the covenant, for the expenses so incurred. For the defendant it was argued that, the notice to repair being under s. 85 of the Metropolis Local Management Act, 1855, as amended by the Act of 1862, ss. 64 and 96, the expenses were imposed upon the owner and were now no longer "duties" payable in respect of the premises:—

Held, following "Thompson v. Lapworth" (1868) L. R. 3 C. P. 149, and "Brett v. Rogers," [1897] 1 Q. B. 525, that the obligation of reconstructing the drains was a "duty" payable in respect of the premises, and that the defendant was therefore liable to pay the amount expended by the plaintiff in complying with the notice of the vestry.—(FARLOW v. STEVENSON.) Byrne, J. W. N. 30 (2) 1899.

SEWERS.—*Nuisance by sewage—Drainage of houses—Want of structural convenience—Liability of owners—"Drain"—"Sewer"—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 4, 13, 15, 21, 94, 95.*

The appellants were summoned by the sanitary authority of a borough for non-compliance with a notice to abate a nuisance caused by turning slop and scullery water from twelve houses, owned by the appellants, into a drain constructed beside a highway to receive the surface water of the highway, which emptied into an open ditch. According to the plan, deposited with the sanitary authority when the houses were built by the appellants' predecessor in title, the houses should have been drained into cesspools, but cesspools to receive the slop and scullery water had not been constructed. No sewer had been constructed by the sanitary authority, by means of which the houses could be drained. The houses were separately occupied, and were not within the same curtilage. The justices made an order to abate the nuisance, by disconnecting the drains of the houses from the surface-water drain, and making cesspools for the houses. On a case stated:—

Held, that the sanitary authority were not bound, under the Public Health Act, 1875, s. 15, to provide a sewer to drain the appellants' houses, that the surface-water drain, though for some purposes a "sewer," within the meaning of s. 4, was not a sewer into which the appellants were entitled to empty their drains, that the nuisance was caused by the want of a structural convenience, within the meaning of s. 94, and therefore the defendants, as owners, were liable.—(KINSON POTTERY CO. v. POOLE CORPORATION.) Div. Ct. [1899] 2 Q. B. 41.

SEWERS.—*Vesting in local authority—Sewer made by landowner "for his own profit"—Public Health Act, 1875 (38 & 39 Vict. c. 55), s. 13, sub-s. 1.*

A sewer made by the owner of a quarry for the purpose of carrying off surface water coming on to his land, and thus preventing it from entering and flooding the quarry, is not a sewer made by any person for his own profit within the meaning of s. 13, sub-s. 1, of the Public Health Act, 1875.—(SYKES *v.* SOWERBY URBAN DISTRICT COUNCIL.)
Div. Ct. [1899] 1 Q. B. 979.

STREETS.—"*New street*"—*Width of Street—Local authority—Towns Improvement Clauses Act, 1847 (10 & 11 Vict. c. 34), s. 63.*

Held, that the decision of the House of Lords in *Robinson* v. *Barton-Eccles Local Board*, (1883) 8 App. Cas. 798, as to the meaning of the term "new streets" in s. 157 of the Public Health Act, 1875, governs the construction of the same term in s. 63 of the Towns Improvement Clauses Act, 1847.

A country lane in the neighbourhood of a town, and situate within the district of the urban district council of that town, was defined for the greater part of its length (581 yards) by hedges. On one side of it were buildings, extending for 485 feet along the lane, belonging to brickmakers, who were proposing to erect on the other side of the lane, opposite to their existing buildings, new buildings, which would extend for 233 feet along the lane:—

Held, that by the erection of these new buildings the lane between them and the old buildings opposite would become a "new street" within the meaning of s. 63 of the Towns Improvement Clauses Act, 1847, and subject to the provisions of that section as to width.

An interlocutory injunction was accordingly granted to restrain the defendants (the brickmakers) from building so as to make or lay out the lane as a new street less than thirty feet wide.—(ATTORNEY-GENERAL *v.* RUFFORD & Co.)
North J. [1899] 1 Ch. 537.

WATER-CLOSETS.—*Entry on Premises—Order for—Local Authority—Justices—Jurisdiction—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 36, 305.*

Where an application is made under s. 305 of the Public Health Act, 1875, to a court of summary jurisdiction for an order authorizing a local authority to enter upon premises for the purpose of making a sufficient water-closet there in pursuance of the powers given by s. 36, the Court has no jurisdiction to entertain an objection by the owner of the premises that such entry is unnecessary because they are already provided with sufficient sanitary appliances.—(ROBINSON *v.* SUNDERLAND CORPORATION.)
Div. Ct. [1899] 1. Q. B. 751.

WATER-CLOSETS.—*Privies and water-closets—Local Authority—Powers—Substitution of water-closet for privy—Public Health Act, 1875 (38 & 39 Vict. c. 55), s. 36.*

By s. 36 of the Public Health Act, 1875, if a house within the district of a local authority appears to such authority, by the report of their Inspector of Nuisances, "to be without a sufficient water-closet, earth-closet or privy, and an ashpit furnished with proper doors and coverings," the local authority are directed to give notice to the owner or occupier of the house requiring him "to provide a sufficient water-closet, earth-closet or privy, and an ashpit furnished as aforesaid, or either of them, as the case may require.":—

Held, that a local authority had power under this section, upon being satisfied that a house within their district was without a sufficient privy, to require the owner (subject to his right to appeal to the Local Government Board under s. 268) to provide a sufficient water-closet in the place of the existing privy.—(NICHOLL *v.* EPPING URBAN DISTRICT COUNCIL.)

Stirling J. [1899] 1 Ch. 844.

SEWERS.—*Drain—Drainage of group of houses by combined operation—Nuisance—Order of local authority—Subsequent deviation—Metropolis Local Government Act, 1855 (18 & 19 Vict. c. 120), s. 250.*

In 1879 an order of the vestry was obtained under the Metropolis Local Management Act, 1855, for draining a group of eleven houses by a combined operation. It was subsequently discovered that there had been a deviation in the course of the drain from the plan signed by the surveyor, but there was no evidence that any houses other than those on the plan were drained by the combined operation:—

Held, that a mere deviation in the course of the drain was not sufficient to convert it into a sewer, and that the vestry was not therefore liable for its repair.—(GREATER LONDON PROPERTY CO. *v.* FOOT.)

Div. Ct. [1899] 1 Q. B. 972.

STREETS.—*Vesting of streets—Subsoil—Extent of ownership—Metropolis Management Act, 1855 (18 & 19) Vict. c. 120), s. 96—Illegal breaking up of street—Mandatory injunction.*

Held, that the decision of the House of Lords in "Tunbridge Wells Corporation *v.* Baird" [1896] A. C. 434, as to the extent to which the soil of a street is vested in a local authority under s. 149 of the Public Health Act, 1875, applies to the similar vesting in a local authority under s. 96 of the Metropolis Management Act, 1855, so that the soil of a street is vested in a vestry under s. 96 only so far "as is necessary for the control, protection and maintenance of the street as a highway for public use."

An electric lighting company had illegally broken up the surface of a street within the district of a vestry in the metropolis, and placed their pipes and wires at a depth of about two feet below the surface:—

Held, that the vestry were not by virtue of s. 96 the owners of the soil of the street at that depth, and that although the company had acted illegally in breaking up the street, the vestry could not maintain an action for a mandatory injunction to compel the company to remove their pipes and wires, there being no continuing trespass upon or interference with any right of the vestry.

Decision of Jeune P. (to whom the above case was not cited) reversed.—(St. Mary, Battersea (Vestry of) v. County of London and Brush Provincial Electric Lighting Co.)

C. A. [1899]; 1 Ch. 474.

VACCINATION.—*Conscientious objection—Requirement of production of birth certificate—Vaccination Act, 1898 (61 & 62 Vict. c. 49), s. 2.*

Upon an application by the parent of an unvaccinated child, whose birth has been registered, for a certificate of conscientious objection under s. 2 of the Vaccination Act, 1898, the justices are entitled to refuse to give such certificate unless and until the applicant produces to them a certificate of the registration of the child's birth.—(Reg. v. Lowndes).

Div. Ct. [1899]; 1 Q. B. 577.

WATER.—*Waste—"Person supplied with water"—Suffering waste—Liability to penalty—Owner of house not exceeding £10 rent—Waterworks Clauses Act, 1847 (10 & 11 Vict. c. 17), s. 72.*

By the provisions of a water company's special Act, if "any person supplied with water" by the company negligently suffered the water so supplied to him to be wasted he was liable to a penalty:—

Held, that where a house was let to a tenant at a rent not exceeding £10, so that the owner was liable under s. 72 of the Waterworks Clauses Act, 1847, to pay the water rates instead of the occupier, the owner was a "person supplied with water" within the meaning of the special Act, and was under a duty to take care that the water supplied was not wasted.—(Brock v. Harrison.)

Div. Ct. [1899] 1 Q. B. 958.

WATERCOURSE.—*Riparian owner—Stream—Interruption—Alteration—Local authority—"Injuriously affecting"—Consent of Riparian Owner—Public Health Act, 1875 (38 & 39 Vict. c. 55), s. 332.*

Where a riparian owner has a common law right to the uninterrupted flow of a stream past his tenement, the local authority, in interrupting or altering the flow for the purpose of providing a water supply for their district under the Public Health Act, 1875, are "injuriously affecting" the stream within s. 332, which they are not entitled to do unless they have first obtained the written consent of the riparian owner under that section, the local authority having no compulsory powers under that Act to interfere with or alter the flow

of the stream, and the common law right of the riparian owner being unaffected by the Act. He is therefore entitled to bring an action to maintain his right, even though the act of the local authority may cause him no sensible damage.

"Swindon Waterworks Co. *v.* Wilts and Berks Canal Navigation Co.," (1875) L. R. 7 H. L. 697, considered.—(ROBERTS *v.* GWYRFIA DISTRICT COUNCIL).

Kekewich J. [1899]; 1 Ch. 583.

At Southwark, Morgan John, a milk dealer, of Tobard Street, Borough, was summoned, at the instance of Mr. Edwards, the Inspector of St. George-the-Martyr Vestry, for refusing to sell a sample of milk to him. Mr. Sydney defended. Mr. Edwards stated that, on his demanding 1½d. worth of milk and tendering the money, Defendant declined to sell a sample from one of three cans standing in the shop, alleging that its contents had already been sold. Mr. Sydney contended that that there was no refusal to serve from the first and third can, and with regard to the second, that it was not exposed for sale as prescribed by the Act. As a matter of fact, the can as it stood in the shop was ready to be delivered to a firm in Bermondsey. Mr. Slade said that from the evidence of the Inspector it was clear that there was nothing to show that the milk in the second can was not for sale. Were the Defendant's contention admitted, it would become easy for milk dealers to avoid detection by refusing to supply samples. He, therefore, imposed a penalty of £3 and 2s. costs.—"*Times*," *May 26th*, 1899.

THE SANITARY INSPECTORS EXAMINATION. A RETROSPECT.

Now that The Sanitary Institute have, at the request of the Local Government Board, joined with other bodies in the formation of an enlarged Examination Board, for the purpose of conducting examinations for Sanitary Inspectors under the Public Health (London) Act, 1891, which Board will in future carry on, as far as London is concerned, the work so successfully performed by the Institute for the last twenty-two years, it may be deemed fitting that the occasion should not be allowed to pass without some review of the results hitherto attained, which are attributable to the forethought and wisely far-sighted policy of the founders of the Sanitary Institute's Examination.

Twenty-two years ago the science of hygiene was very imperfectly—if at all—understood, and its practice was lamentably defective by all those engaged in the building and allied trades, and even by those who were nominally engaged in sanitary

work—the Inspectors of Nuisances of that period—men who were very frequently appointed for almost any reason except that they were fitted for the post by previous study and training in sanitary questions and methods. As a result of this condition of affairs the educated public, which was beginning to obtain some grasp of the true significance of defective sanitation, was loudly declaiming the sins of the scamping builder, the ignorant plumber, and the careless bricklayer. The Inspectors of Nuisances themselves—the men who were appointed to control the vagaries and incompetencies of builders, plumbers, and bricklayers—were not above suspicion of that kind of petty bribery and corruption which is almost inseparable from a class of men elected to perform duties for which they have no predilection, no prior training, no certification, and none of that pride of profession which these circumstances of education and training carry with them. Those who care to turn back to the sanitary literature of twenty years ago will find an account of these things; and those who are practically engaged in sanitary work at the present time can confirm, from their own experience, the convictions which were twenty years ago loudly proclaimed, that much defective sanitary work was then being done in and about houses—the fruit of ignorance, carelessness, and lack of skilled supervision.

To a very large and increasing extent this deplorable state of affairs is now becoming a tale of the past. Not all local sanitary authorities are enlightened as to what sanitation is, and how to pursue it; and not all builders and their workmen can be trusted to put in sound work in a workmanlike manner; but still the improvement in twenty years has been immense. It is only fair that credit should be given to those who have contributed in an important degree to a change so beneficent to the public and so far-reaching in its effects; and we say, advisedly that the system of training, education, and certification for sanitary work, which has been one of the special features of the work of The Sanitary Institute during the past twenty years, has been in a special and marked manner effective in securing this result.

In 1877, when the examinations were first commenced, the Institute was much ahead of the times. For nine years the number of candidates annually examined was small—for seven years very small. But there was no occasion to despair; the ground was being prepared, the seed was being sown, and the directors of the Institute's policy were content to wait and to abide the time when their labours were to bring forth fruit. In 1886, for the first time, the number of candidates rose to over 100; in 1892 they were over 500; and in 1898 nearly 600.

The success of the Institute's examinations—a success it must be remembered which was only obtained after many years of comparative failure, and by means of much hard work on the part of the Examiners, coupled with the determination that the examination should acquire a reputation for soundness and absolute fairness—induced other Societies working on somewhat similar lines to the Institute to endeavour to obtain a share in a work which had been inaugurated and carried to a successful issue by the Sanitary Institute alone, with the result alluded to above.

The negotiations with the Local Government Board, and the composition of the new conjoint Examination Board for the examination of candidates for appointments in London, are sufficient evidence that the Council of the Institute has met the views of the petitioning Societies in a fair and frank spirit, and with no desire whatever to exclude from participation in a good work those who are really qualified to assist in its performance, however little they may have aided the movement in its initial stages and days of difficulty.

If sanitary authorities all over the country now require that candidates for the post of Sanitary Inspector must show a certificate of competency to perform the duties of the office, granted by the Institute, if the building trade has been thoroughly leavened with men who understand what good sanitary work is, and know how to do it, if the knowledge of the importance of good sanitation has spread far and wide throughout all classes of society—and few will care to deny the truth of these suppositions—the Sanitary Institute is willing to accept such a record of work done in the past as sufficient compensation for all its efforts, and is content to believe that it is fulfilling its aim in sharing with kindred societies a position of great trust and responsibility, which has been created by itself in twenty-two years of hard and efficient work.

The Examinations were established in 1877, and the following figures show the total number of Examinations held, and the number of candidates:—

To December, 1898:—	Examinations	Candidates Entered.	Candidates Certificated.
For Local Surveyors........	35	291	142
Practical Sanitary Science ...	24	200	101
Sanitary Inspectors	107	4,924	2,822
	166	5,415	3,065

It is prescribed by the regulations of the enlarged Board

that all persons holding the Inspector's Certificate granted by The Sanitary Institute before December, 1898, are to be entered on the Register of the enlarged Board. The 2,822 names in the above will therefore form the basis of the new Register.

The enlarged Board now formed, The Sanitary Institute and other bodies for the purpose of conducting Examinations for Sanitary Inspectors under the Public Health (London) Act, 1891, entitled SANITARY INSPECTORS EXAMINATION BOARD *(formed by The Sanitary Institute and other bodies)*, has issued the following syllabus :—

REGULATIONS AS TO EXAMINATIONS AND INSTRUCTION.

The Examination shall consist of two parts, Preliminary and Technical.

The Preliminary Examination shall be written and oral, upon the following subjects :—

English, including writing, spelling, composition, and dictation.

Arithmetic, including fractions, vulgar and decimal, simple proportion, common weights and measures, mensuration of rectangles and rectangular solids as required by Schedule 1, Standard 6, of the Day School Code, 1898, of the Education Department, together with mensuration of circles, cylinders, and spheres.

No candidate shall be approved who fails to show in each of these subjects such proficiency as shall satisfy the Examiners of his ability to prepare official reports.

The Technical Examination shall be written, oral, and practical, upon the following subjects so far as they bear upon the duties of a Sanitary Inspector :—

1. Elementary Physics and Chemistry in relation to Water, Soil, Air and Ventilation.
2. Elementary Statistical Methods.
3. Municipal Hygiene or Hygiene of Communities, including Prevention and Abatement of Nuisances, Sanitary Defects in and about Buildings and their Remedies, Water Supplies, Sanitary Appliances, Drainage, Refuse Removal and Disposal, Offensive Trades, Disinfection, Food Inspection.
4. Statutes, and the Orders, Memoranda, and Model By-Laws of the Local Goverment Board, and the By-Laws in force in the Administrative County of London.

Every candidate must forward to the Secretary of the Board not later than fourteen days before the commencement of the Examination notice of his intention to present himself for examination, and

lf the appointed fee. The remaining half of the fee must be paid t later than seven days before the date of the Examination.

Candidates for the Technical Examination must pass the Prelimiry Examination, unless they shall have passed an Examination cognised by the Board in substitution for it; and must forward to e Secretary of the Board not later than fourteen days before the mmencement of the Examination :—

1. Evidence of having attained the age of twenty-one years.
2. A recent testimonial as to personal character; if possible, from a Clergyman, Medical Officer of Health, or other person holding an official position.
3. Evidence of having passed a recognised alternative Examination, in the case of candidates who claim exemption from the Preliminary Examination.
4. Evidence of training, consisting of :—
   (a) Evidence of having held for not less than three years previous to the First day of January, 1900, the office of a Sanitary Inspector or Inspector of Nuisances in a Sanitary District in the United Kingdom having a population of not less than 5,000 at the last census; or
   (b) A Certificate of Instruction, as prescribed below, from an Institution recognised by the Board.

The Certificate of Instruction must show that the candidate has attended a course of Instruction approved by the Board, consisting of not less than 32 systematic lectures supplemented by demonstrations and comprising the subjects of the Technical Examination, including :—

(a) Elementary Physics and Chemistry in relation to Water, Soil, Air and Ventilation.

(b) Building Construction in its Sanitary relations. Measurement and drawing plans to scale.

(c) The practical duties of a Sanitary Inspector, *e.g.*, drawing up notices as to sanitary defects, taking samples of water, food, and drugs for analysis, food inspection, drain-testing, disinfection, methods of inspection, note-taking and reporting.

The fee for the Preliminary Examination shall be one guinea, and for the Technical Examination, three guineas. No fees will be returned except in the case of a candidate who having entered for both Examinations fails to pass the Preliminary Examination, in which case the fee for the Technical Examination will be returned to him.

If a candidate be prevented from attending by illness, or by other cause deemed sufficient by the Board, he will be admitted to the next Examination without further fee.

An unsuccessful candidate will be admitted to one subsequent Examination on payment of one-half the above fees.

The Examinations shall be held twice in each year. The first

Examination shall commence on the first Tuesday in December, 1899, and will be conducted as follows:—

Preliminary Examination—

Tuesday:	10 a.m. to 1 p.m.	written and oral.
	2 p.m. to 5 p.m.	

Wednesday: 10 a.m. .. Results of Preliminary Examination Published.

Technical Examination—

Thursday:	10 a.m. to 1 p.m.	Papers.
	2 p.m. to 5 p.m.	
Friday:	10 a.m. to 1 p.m.	Papers.
	2 p.m. to 6 p.m.	Practical.
Saturday:	10 a.m.	Oral.

Every candidate who passes the Examination will receive a Certificate to that effect, qualifying him for appointment as Sanitary Inspector under Section 108 (2) (d) of the Public Health (London) Act, 1891, and under any subsequent Act of Parliament or Order of the Local Government Board which may require Sanitary Inspectors or Inspectors of Nuisances to hold Certificates.

St. Stephen's House, London, S.W.

All communications to be addressed to the Hon. Secretary, 1, Adelaide Buildings, London Bridge, London, E.C.

June, 1899.

The examination and training proposed by the syllabus should tend to bring a class of candidates more educated in the theory of Hygiene into the ranks of Sanitary Inspectors in London.

Probably at first there may not be many candidates prepared to undergo the examination, and this might create a difficulty in filling vacant appointments, if it were not that the new examination is only required for appointments in London, and that there are already on the Register of the new Board the names of some 2,800 candidates who have previously received certificates from The Sanitary Institute and are eligible for appointments in London.

The Sanitary Institute is not now granting certificates under the London Public Health Act, but is still continuing on the same lines as before its examinations both in London and the provinces for candidates who desire a certificate as Inspectors of Nuisances under the Public Health Act, 1875.

[Ed.]

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THE SANITARY INSTITUTE.

CONGRESS AT SOUTHAMPTON.

INAUGURAL ADDRESS

By Sir WILLIAM HENRY PREECE, K.C.B., F.R.S.,
President Inst.C.E., &c.

Delivered August 29th, 1899.

It gives me great pleasure to deliver an address in a hall where I have spoken so frequently before, and to find myself again in the beautiful town of Southampton, where I spent fifteen of the busiest and happiest years of my life. I have described many novelties here, but I am now about to open a tale of discovery research and practical application as startling and as beneficent as any other that has characterised and immortalised this marvellous age of Queen Victoria.

Since our last Congress we have lost one of our shining lights. Sir Douglas Galton was the personal friend of many of us. He was connected with the Institute from its commencement, and took a very active part in every branch of its work. The last Annual Report of the Council was signed by him on March 3rd. He died on March 10th, 1899. He was an admirable organiser, and to him we are greatly indebted for the Joint Examination Board for London Sanitary Inspectors. Indeed he was the centre, and in many cases the originator, of most of the important schemes carried out by the Institute. He was a master of detail. He was essentially a courteous English gentleman. His strict sense of honour and justice, kindness of manner, and consideration for others will always be deeply remembered by those who mourn his loss.

The human frame is a little world in itself, inhabited by different nations and by different races, born, living and dying in us as we do on this earth, perhaps in peace, generally in war, and fortunately for us not yet free from the abuses of cannibalism. There are many millions of living micro-organisms flourishing in every body in this hall. As long as we are in

health they live in peace, and we remain unconscious of their existence; but let some external enemy, some mute, inglorious, invisible bacterium force the ramparts, and enter the fort, then there is bitter war, and either the invader is destroyed by our friends, or we ourselves succumb to cholera, typhoid, diphtheria, or to the growth of some other inimical but victorious bacterial race. Our chief diseases are due to the invasion of these merciless foes. History is repeated in our bodies. We are only on the brink of this new world. Every year is prolific with new facts, and doubtless this meeting of The Sanitary Institute in Southampton will disseminate new truths, and help to enlighten many an obscure point.

The principle object of modern sanitary science is to develope this new empire of Bacteria, and to discover its races and their peculiarities. The chief function of the sanitary engineer is to defend the human frame from its minute invisible and insidious external foes. Protection from disease is the art of defence. We must know our enemy, detect his presence, defeat his movements, and destroy him as he would destroy us.

The greatest sanitary engineer the world has ever known was Moses. The Book of Leviticus is a treatise on hygiene. For 3,400 years the world stood still, and only one sect followed the doctrines and teachings of that Great Master. The Christian threw his tenets to the wind—the Mahometan, to his great benefit, has continued to practise some of his principles to the present day. The Jew remains ever faithful, and is the healthiest and longest-lived type of humanity. The doctrines of Moses can be summed up as the objects of sanitation to-day:—

I. Pure air.
II. Pure water.
III. Pure food.
IV. Pure soil.
V. Pure dwellings.
VI. Pure bodies.

Let us consider the doctrines of Moses with the means that modern Science has placed at our disposal. While the practice of his preaching made "the days of our years three score years and ten," there is no reason why we should not now make the days of our years five score. But we leave undone the things we ought to have done, and the world in general thinks that life would be very miserable if we did only what we ought to do. Hence we are no better off than David was.

While research and discovery are abroad, while the practice and science of Sanitation are in a state of rampant transition,

while bacteria are regarded by some as a passing phase of fashion, and by others as a great discovery come to stay, it is clear that we cannot yet have reached finality. Before practice can become uniform, and before principles can be generally accepted, much remains to be done by this Institute, established in 1876 to promote the advance of sanitation in all its branches, and to diffuse knowledge relating thereto.

It is clear that a President in his address can only diffidently summarise his own views of the present state of the science. As an engineer I can deal only in a broad and general manner with the engineering practice of each section. Where differences of opinion are so numerous and practices are so divergent, one is moving on sensitive ground. I hope to tread on the fewest possible number of corns.

There are three very important principles underlying all the practical applications of Sanitary Engineering.

(1) Energy or the ability to do work.
(2) Chemistry or the power to transform matter.
(3) Life.

(1) The principle of Energy affirms that this capacity for doing work is a fixed quantity in the universe. Energy can neither be added to nor destroyed. It can only be transformed from one kind of motion to another—material or ætherial. The motion of matter can be converted into the motions of the æther or *vice versâ*. Sound, light, electricity and heat are mere forms of energy. Whenever work is done on the earth, it is at the expense of energy withdrawn from somewhere else. The sun is the centre and spring of all energy on this earth. The function of the engineer is to apply this principle of energy to the comfort, happiness and health of man.

(2) The principle of Chemistry affirms that the quantity of matter in the universe is also fixed, and that it can neither be added to nor destroyed. Matter is reducible to about seventy elements and it is found in three states, solid, liquid and gaseous. All that the Chemist can do is to transform matter from one state to the other, and from one compound to some other by linking, de-linking and re-linking the atoms and molecules in various combinations.

(3) The principle of Life is beyond our comprehension. All we know is that, by expending energy on matter, life in the very tiniest germ that moves, so small as to be beyond the reach of the senses, performs with unfailing accuracy the duties of the engineer and the chemist. Life, however large or however small may be the receptacle for its operation, plays some important function in the economy of Nature and if we

cannot divine the reason of its existence, it is because we are able to read the book of God only as through a glass, darkly.

I.—Pure Air.

The supply of pure air to those who breathe it, is the object of ventilation. Moses did not legislate for ventilation, for dwellings in Egypt, as in the East generally, were open to the heavens. The Israelites dwelt in tents, but he showed how to prevent the pollution of air by the decomposition of refuse, for he ordered it to be carried out without the camp into a clean place, and there be burnt. We are only now learning to follow Moses' lead, for refuse destructors are quite a modern and up-to-date "invention." We are even utilising their heat for the generation of steam for electric lighting generating stations, and we are thereby economising waste, the highest function of the engineer.

Air which has passed through the lungs becomes charged with water vapour, carbonic dioxide, perhaps with some other organic matter, and even with bacteria. It is often polluted by smoke and charged with fog. It becomes vitiated, and is really "air sewage." If gas, oil or candles are burnt for artificial light the air is still further contaminated by sulphur, carbonic dioxide, and sometimes even by carbonic monoxide, a more poisonous gas when breathed. The consumption of air by every one of us exceeds in weight five times all the food and drink we take. In cold climates where dwelling indoors and with closed windows is imperative, it is essential for health that this vitiated air should be periodically replaced. Thus the whole theory of ventilation is circulation of air maintained at a proper temperature, for cold air may be injurious. The British legislative has taken care that lunatic asylums, hospitals, workhouses, and jails shall be well provided with proper air space per person, and shall be supplied with effective means for ventilation, but churches, chapels, theatres, meeting halls, assembly rooms, railway carriages, and other places where healthy, honest and well-to-do people most do congregate, are totally neglected, and remain sinks of discomfort. Who does not dread a dinner party, even in his dearest friend's house! People have a horror of draughts, windows are mercilessly kept closed. We dread cold and neglect air.

The minimum cubical space in feet for hospitals is 1,000, and for factories 250. In a dining room where I recently dined with four gas burners alight, by taking each gas burner as equivalent to five persons, the cubic space was 160 feet per

head, and this air remained stagnant for two hours, and hence my head became an aching mass. In a third class railway carriage, when full, it is only 47 cubic feet per passenger.

What constitutes a draught? Is it air moving with a velocity of over 3 feet per second? We glory in a breeze at much higher velocities in the open. Is it difference of temperature between air and the blood? What is more exhilarating than rushing on skates against an icy blast? Is it the relative dryness of air promoting evaporation from the pores of the skin? Water is thus cooled in hot countries. I must leave the medical fraternity to answer. Can we not train ourselves to endure draughts? Ladies and children sit with pleasure and impunity facing the locomotive in a railway carriage with the full blast of a gale of wind upon their delicate frames. If the air is pure, the temperature and dryness normal, the winds may crack their cheeks against the healthy frame, but when the difference of temperature is considerable, the skin active, and we feel sleepy, it requires courage, if not temerity, to resist the temptation to close the window.

The problem is to promote thorough circulation without imparting the feeling of draught, and without affecting the temperature or the humidity of the air. Here alas, practice is very divergent. Is the circulation to be promoted by natural or by mechanical means? Is the outlet to be at the ceiling or floor level? Is the pure air to be forced in by pressure, or the foul air to be drawn out by vacuum? Is the admitted air to be warmed in winter and cooled in summer, and how? Is it to be filtered and freed from dust? Every system of ventilation needs intelligent supervision. Tobin was a public benefactor, and his tubes a valuable aid to solve our problem—but ignorance, fancy, and super-sensitiveness lead to the closure of their ends! What is the standard of purity of air? Some define it by the quantity of carbon dioxide it contains. This should not exceed 8 volumes per 10,000, but there are other and greater impurities in used up air that cannot be defined, Every adult exhales ·6 cubic feet of carbonic dioxide per hour. and 3,000 cubic feet of air per head is required to maintain this purity. Thus, if the cubic space per person in a bedroom is 500 feet, the air should be changed six times every hour. This is a difficult condition to maintain, and the difficulty increases with the dimensions of the dormitory, for the sleeping space is superficial and the air space is cubical.

Electricity has fortunately come in to simplify our difficulties. It has the great merit that in the glow-lamp it does not vitiate the air. It supplies us also with a convenient form of energy to promote circulation either by forcing in the outer

air or by drawing out the foul air. It can even warm the air, and it can sift from it all material and bacterial impurities before admission. Where the energy is cheap, as in a free waterfall, it can be used not only for lighting, but for heating, cooking, ventilating, and for all mechanical purposes such as raising lifts, cleaning knives, &c. If electricity were properly utilised in our homes the span of life should certainly be extended beyond David's allotted span.

II.—Pure Water.

When Moses on two separate occasions smote the rock in the wilderness with his rod, so that water came out abundantly, and the murmuring children of Israel drank, and their beasts also, did he perform real miracles, or did he exercise that scientific insight with which he was inspired to discover natural and abundant sources of the true staff of life? Again, was the water that flowed from the rock in Horeb, as well as that in Kadesh, absolutely pure, or was it tempered by air, hardened by matter, or made physically and beneficially active by life? It is a moot question whether absolutely pure water is healthy, and hence we have not yet secured a universally accepted definition of practical purity. Is purity to be determined by the quantity of organic matter in suspension or in solution, by its hardness, by the amount of micro-organisms it contains, or by the amount of injury it inflicts on human life? The supply of water, prior to this beneficent Victorian age, was from wells, local rivers, and rain. Sir Edward Frankland —our most recent scientific loss—found in Thames water 160,000 bacteria per cubic centimetre—a small thimbleful, about in fact twenty drops. Good drinking water should, however, contain not more than twenty bacteria per cubic centimetre. Its hardness will depend upon the geological strata from which it is drawn, and its pollution upon its source of supply. It would be well if every water supply could have its own protected area free from the contamination of man. Maidstone, in 1897, suffered terribly from accidental pollution by the typhoid bacillus. Birmingham, with great foresight, has purchased two fine valleys in Mid-Wales, and no human habitations are to be allowed in this region.

Rivers are polluted not alone by the excretions of humanity, but by the refuse of trade and of manufacture. Pollution has not yet been made a penal offence. The Rivers Pollution Act of 1876 was inefficient, and is in many places practically obsolete. The Chinese are in advance of us. In that country,

sewage—the chief cause of pollution—goes to benefit the land, not to pollute the river.

Getting good water and maintaining it good is the chief work of the sanitary engineer. Polluted water is now purified and softened *mechanically* by sand filtration, an imitation of nature; *chemically* by precipitation and by the action of vegetation; and *biologically* by the chemical activities and cannibal habits of living organisms.

The water engineer who desires to pursue his avocations, to comply with all the requirements of modern civilization, must know something of physics, chemistry and biology. The microscope, the scales, the test tube and the retort and other instruments of precision should alone be his companions.

But the maintenance of good water is not the duty of the engineer—it is the function of the powers that be, and the constant concern of the user. Regular and active inspection must be maintained, and above all care must be exercised to prevent waste. Cheap and nasty fittings must be eschewed, and all the supply of a district should ever be under the strictest control.

While 2 or 3 gallons per head are sufficient for simple dietetic purposes, many more gallons are used for watering streets and gardens, flushing closets and drains, extinguishing fires, washing carriages and for general stable work, and factory purposes. The consumption of water is thus very variable. While in most English cities it rarely exceeds 25 gallons per head per day, in New York it reaches 60, and in Philadelphia 90 gallons. It would seem as though carefully-purified water is misused when it is applied to such public purposes as to lay dust, to generate steam, and to flush the public sewers—processes which lead to repollution without any benefit whatever. Should there not be a duplicate supply, one for domestic and the other for public purposes? This is already done at Richmond and St. Helens. Sea-water is used at Great Yarmouth and Bournemouth. Indeed, the use of sea-water as an auxiliary supply for public purposes deserves the serious examination of all local magnates at our seaside resorts. It is well worth the consideration of the London County Council, for if used for public purposes it would practically more than double the Metropolitan supply for domestic use. It is better for them to go to the sea, which is near to them, than to go so far as to gallant little Wales that does not intend, in spite of its gallantry, to let London rob it of its water. Birmingham and Liverpool have taught it experience. The Thames Valley ought to be able to supply London with excellent drinking water for the next 50 years —even with its present works. Five thousand tumblers of

[illegible] only one grain of solid matter, and the

[illegible]

ERRATUM—VOLUME XX.

Page [illegible], line 1: for "grain" read "gramme."

[illegible] at Nottingham at the suggestion of their engineer, Mr. [illegible], in 187[illegible], and it is still at work. This system has, moreover, received the sincerest flattery by being imitated by many excellent, though by some cheap and nasty variations of form and of action.

III.—Pure Food.

It was in the regulation of the food supply of the Israelites that Moses displayed his profound knowledge of the hygienic requirements of Eastern nations. It is by adhering to these regulations to the present day that the Jews live such healthy lives. His division of beasts into clean and unclean was a separation of the digestible from the indigestible. Pork in England is indigestible. In the East it is uneatable, and this, because often, as of old in the wilderness, the pig is the scavenger. Fat and blood were expressly forbidden, and fish that have not fins and scales.

Parliament does not prescribe our daily food, but it does legislate against impure food. The enormous importation of food into this country renders it imperative that strict and rigid inspection should be exercised upon its condition. We rarely take up a newspaper without reading of the seizure of diseased meat, of decayed fruit, and of fish unfit for food, followed by exemplary punishment. Cold storage or the artificial production of cold has rendered possible the importation of meat from our most distant colonies, and few of us know whether the most delicate and tender saddle of mutton on our table is, as asserted, from Wales, or from New South Wales, or from New Zealand. The probability is that it is from the latter place, for imported

›n of the germs of disease, especially of the bacillus of ver and of tuberculosis. Unclean milk is too common, tunately inspection and examination of cows, cow-ies, and milk cans are, in many districts, thoroughly It is not at present under the control of the nitary authorities. It is indeed a serious question ll milk should not be sterilized by boiling, or by being a temperature of 160° Fahr., which is said to be This is a simple remedy which every householder apply at home, and one which many of us unwittingly ı drinking coffee, tea, and in making puddings, but we ways apply it in feeding infants or in drinking cold is very easy to attack the food supplier, but we food l consumers are much too callous to the simple super-remedies in our own hands at home.

k business of this country, especially of the metro-fortunately falling rapidly into the hands of large ıpanies, who are well able to protect themselves, and ; their clients, the public; but in small urban and listricts it remains in the hands of the individual ho is often a member of the very local authority d enforce regulations, which it is his own interest to It is a misfortune that the co-operative system of has not been introduced into this country. There a ral dairy, creamery, buttery, and cheesemaking estab-s managed by a small board of management, elected contributing farmers, who are scattered over the

London water contain only one grain of solid matter, and the

first done by the Post Office in Nottingham at the suggestion of their engineer, Mr. Rofe, in 1877, and it is still at work. This system has, moreover, received the sincerest flattery by being imitated by many excellent, though by some cheap and nasty variations of form and of action.

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even now often to be found in isolated dwellings. The water-closet is the introduction of this century; and we are now—by a remarkable process of evolution—returning to the natural principle initiated by Moses.

The system of treating and disposing of sewage can be considered under three heads:—

i.—Mechanical.
ii.—Chemical.
iii.—Biological.

The first system deals with the removal of all the organic and inorganic matter in sewage. The former is putrefactive and may become offensive. The latter is matter in the wrong place, and must be collected. Both forms must be removed. The mechanical system includes the committal of the crude sewage to earth improved in the present day by the dry earth system, the distribution of the contents of the cesspools, the midden, and the pail, over and in the land, and the simple water-carriage system to the sea or to the river.

The second system includes various plans for the precipitation of solids, the filtration of liquids, and the formation of artificial manures.

The third system extends the second to the aëration of the clarified sewage, so as to secure the nitrification of the organic matters in suspension or solution by bacterial agencies, to enrich the land, and to purify the effluent for further use.

The tendency of all these systems is ultimately to restore the balance of Nature, to avoid waste, to promote the circulation of matter, to utilize the principle of energy, and to encourage that incomprehensible agency, *Life*, to pursue beneficently its allotted function, to serve the mysterious purposes of the Creator.

I. One of the best examples of water-carriage discharging into the sea is at Portsmouth, where Sir Frederick Bramwell, taking advantage of the direction and velocity of the tidal currents of the Solent, has disposed of the crude sewage so as to avoid any possible nuisance or interference with the enjoyment of those who frequent Southsea beach. Bazalgette did the same at Torquay, while Brighton and Margate are excellent examples of similar good sea disposal. It is not, however, economy or wisdom to make too much use of the sea. It is not so good a natural purifier as a river, for it is deficient in the proper bacteria, and the stuff discharged therein is wasted. Nor is it wise to ignore the sea; for in the Rhondda Valley, although the upper part of it is 27 miles from the sea, it has been found mcst economical to construct an intercepting sewer for

the whole valley, discharging in deep water in the Bristol Channel.

A distinction must be drawn between the requirements of great towns, villages, hamlets, and isolated houses. Every case must be dealt with on its own merits. There is no one process equally suitable for every sewage.

II. Chemical treatment is well illustrated in the case of London where it has hitherto been in operation without any supplementary process, but where recently some very important experiments have been conducted to determine the conditions that would justify the introduction of the biological system. The crude sewage is admitted into precipitating tanks, where it is treated with lime and sulphate of iron in definite quantities. These cause the chemical transformation of the elements and compounds in solution to form solids, which with those already in suspension slowly settle by gravitation as *sludge*. The *effluent* flows into the river at Barking and Crossness. Over 2,000,000 tons of this wet sludge are conveyed every year, 50 miles to Barrow Deep where they are deposited in the sea. The improvement of the Thames in consequence has been very marked. Fish have reappeared, seagulls appear annually above London Bridge. It was only on July 26th, that Mr. Holbein the celebrated cyclist, swam from Blackwall to Gravesend, on the ebb tide, and back again on the flood, being over 12 hours in the water. There was very little fresh water coming down the river at the time. It is a misfortune that this harmless sludge cannot be made a useful and saleable article, but the most careful enquiries have shown that it is practically impossible with such an enormous contributing population—now over 5,000,000—to treat it economically in any other way. The effluent might probably be improved, and this is now under the consideration of the London County Council.

Mr. George Chatterton is carrying out works for Dublin similar to those in London, but the sludge will have to be carried away only 10 miles into the Irish Channel. It now goes direct into the river Liffey, which flows virtually as an open sewer through the city, causing an almost intolerable nuisance, and seriously affecting the public health.

Where the sea is not conveniently placed for the reception of the sludge, land is irrigated and enriched, or sewage farms are established. Wimbledon, where I reside, is one of the best examples. It has recently added biological filtration to the process. The solid matter suspended in the crude sewage is retained mechanically in a porous screen made of broken bricks. It is then passed into the precipitation tanks like those of London, and after settling, the sludge is run into a reservoir

It is then mixed with lime and compressed into cakes. 100 tons are so formed weekly. There is no market or demand for this cake, so it is going to be burnt in a Destructor connected with the Electric Light Installation.

The effluent is run twice on to the sewage farm where sixty acres are cultivated at a profit, with rye grass, osier, mangel wurzel and other market gardening, it then passes purified into the river Wandle. The population is growing so rapidly that the land has become too small and the biological treatment will have to be considerably enlarged.

Land treatment, either by itself, or after the solids have been removed, forms by the requirements of the Local Government Board an essential feature of every scheme for the disposal of the sewage of an inland town. Unfortunately sewage farms as a rule do not pay. It will be a great relief to get rid of them. We have seen during the past Session of Parliament how the Camp Sewage Farm at Aldershot has been violently attacked. The new biological treatment may modify the views of this Board. It is a department extremely well advised and ably administered and we may be sure that if the experimental success of the new system be followed by a sound, practical result, it will carefully safeguard the public requirement and health.

It is impossible to commend too highly the care with which the very able body of Engineering Inspectors attached to the Board examine schemes of sewage treatment and disposal, but there is, unfortunately, a growing habit among local authorities to make material alterations in schemes after they have been sanctioned by the Board. This destroys confidence and in the end acts prejudicially on all concerned, and especially upon those eminent consulting engineers who are generally responsible for the work and whose difficulties are very largely increased by local interferences.

Brewery refuse is difficult to treat. It contains much organic matter, degenerate yeast and water containing sulphates. It has been a source of much difficulty when admitted into public sewers. It should, indeed, be treated at the brewery. A recent and striking example of this occurred at the works of the Anglo-Bavarian Brewery Company at Shepton Mallet, where the Company at their own expense and in a fine public-spirited manner successfully treated their own waste.

III. The new biological treatment is a return to Nature. "Nature never yet betrayed the heart that loved her." That wonderful micro-organism that has eluded man's observation for all these millions of years is divided into two classes—(*a*) bacteria which work with oxygen, and (*b*) those which do not.

The sewage first reaches the settling tanks, where the inorganic matter, such as sand and grit, is deposited by gravity. The albuminous and organic matters and urea which are found in all sewage are then transformed by bacteria into forms of ammonia. The decomposition of animal and vegetable matter, which is invariably due to the action of these bacteria, is thus utilised to liquefy organic solids and in this way to simplify their removal. Other bacteria gradually, in special filters, transform the ammonia by the aid of oxygen and other elements present into nitrates. The process of filtering is intermittent, for air is essential to maintain the supply of oxygen to the nitrifying bacteria; but an air blast, in some cases, is used to maintain a continuous action. The nitrifying effect is enhanced if the air be warmed to about 100° Fahr. The filters must have porosity and resistance to flow to retard the passage of the sewage through them, for time is essential for the bacteria to grow and to act. In sandy ground Nature does this, but on clay formation, coke-breeze, and even coal, is found to be very effective. In this way bacteria first liquefy the solid organic matters in the sewage, and then nitrify them, simultaneously purifying and enriching the effluent, and reducing the formation of that wasted product, sludge. Bacteria thus perform the highest function of the engineer, and Nature asserts her power in fulfilling the clearly-defined will of the Great Creator. The biological system has clearly come to stay. It is, however, still in the experimental stage. No great town has committed itself to its general use. The patent list shows that finality is not yet reached.

Biological methods may be divided into two classes:—(*a*) Those which deal with sewage, clarified by precipitation and filtering; and (*b*) those which attempt to deal with crude sewage. The former plan appears so far to be the most effective. It has been recently applied by Mr. Chatterton to Merton, where unsuccessful have been converted into successful works. The second plan has the merit of greater simplicity; and if the action of the different bacteria be simultaneous, and not successive, it may possess the method of practicability, as well as of economy. More experience is really needed. A Royal Commission is now sitting considering the whole question. It may be some time before their Report is ready. The Chairman has issued a circular to Local Authorities, foreshadowing a long inquiry, and deprecating any delay in carrying out schemes on the ground that the promoters are waiting for the Report of the Commission.

The London County Council are making very valuable and extensive experiments at Crossness, and the conclusion of

their results will have a very far-reaching influence in the country generally on this great hygienic question. An equally important experiment is being made in Exeter, where the Septic Tank promises great assistance to those who have so much interest in the treatment of the sewage of small places, villages, hamlets, and isolated dwellings. The water supply of Carnarvon, where I have a summer residence, is drawn from a lake called Quellyn, into which the drainage of the village of Rhydd-du indiscriminately enters without any treatment whatever. The typhoid or diphtheritic bacillus thus might find its way to Carnarvon. No pollution of a river by unpurified sewage, however minute, should ever be tolerated; particularly when it occurs above the intakes of the water supply of a populous district like Carnarvon. This has alarmed the Town Council of Carnarvon, who have very properly agreed to share the expense of treating the sewage. The Septic Tank process could economically and effectively be applied at such a place.

Darwin was perhaps one of the first to point out how the lower animal life assisted Nature by absorbing as food the decay of vegetation, digesting it and excreting it in the form of mould and loam. His observations on the growth and functions of worms is not the least philosophical and scientific portion of his great labours. He probably attributed to worms much that is done by bacteria. Pasteur, the father of the germ theory, taught us how bacteria acted as Nature's chemist by showing how the yeast germ produced fermentation, and the commercial conversion of alcohol into vinegar shows how another micro-organism takes up oxygen from the air and unites with the hydrogen of the alcohol to form acetic acid and water. The actual mechanical processes through which bacteriolysis pass, expending energy, transforming matter and promoting life, form one of the most interesting pages of the history of evolution ever narrated, for every stage of its growth has occurred during the present generation and within the experience of most of us. Koch, in Germany, has been a worthy disciple of Pasteur. The intermittent benefit of filtration was discovered in the laboratory by Frankland in 1870. Warrington found in 1882 that sterilising by boiling and antiseptic treatment stopped all nitrification. Aerating filters and the true action of bacteria were developed at Lawrence in Massachusetts from 1889 to 1893, Scott-Moncrieff introduced his group of trickling cultivation beds in 1891, Dibdin commenced his experiments in Barking and Sutton with filter beds shortly after, Cameron introduced his Septic Tank in Exeter in 1895, Ducat his continuous filtration process in 1897, and now step by step in Germany, France, and England we have reached a point

where we can fairly say that sewage can be effectively treated with safety, simplicity, and economy by natural means.

Electricity has not played an important part in assisting the sanitary engineer in his attack on sewage. Attempts have been made to assist the oxygenation of water by electrolysis, and the Hermite process has been introduced in Ipswich and in Netley Hospital. The Hermite process decomposes sea water into a powerful antiseptic, disinfectant, and deodoriser. The liquor produced, containing chlorine and chlorites, is called hermitine, and it is laid on at Netley like water. Its economy is doubtful, in face of the astonishing effects produced by the natural process of bacteriolysis.

The sewage treatment of isolated buildings, hospitals, factories, and private country houses, is a very important branch of the subject. The Scott-Moncrieff, Septic Tank, and Ducat systems seem available here, and I hope we may hear something of this subject in our discussions.

V.—Pure Dwellings.

People suffer not alone from ignorance, but from carelessness and filth. The lower the social scale, and the greater the weakness of education, the more callous and indifferent human beings become to cleanliness and comfort; improvidence, the curse of drink, crime and vice are to be ameliorated only by education and by example. The Legislation of recent years by which Local Authorities can improve the dwellings of the working classes, and inspect and control common lodging houses has had a beneficial influence upon the community by clearing away slums, preventing overcrowding, building well designed conveniently arranged houses, and constructing new streets. But unfortunately Local Authorities are much hampered by the restrictions of the Act of 1890, empowering them to improve the dwellings of the working-classes, and they are checked by the greed of vested interests. Edinburgh, by spending £560,000 on improving the Housing of the Poor, has brought down the death rate from 28 to 17 per 1000.

The responsibility of maintaining pure dwellings rests now very much with the sanitary authorities. The Medical Officer of Health is a power. The examination of Sanitary Inspectors in London, thanks to the action of this Institute, is now compulsory under the Public Health (London) Act, 1891. It is not so in the Provinces, but Local Authorities are becoming alive to its necessity and they are requiring the possession of this certificate as one of the qualifications for appointment. The effects of rigid inspection and thorough application of the

powers of legislation are shown by the fact that the death-rate in Surrey is 14, while in North Wales it is 20 per 1,000. 3,000 souls per annum ought not to die in North Wales if Sanitary matters were duly looked after!

Legislation, though often half-hearted, tends very much to increase the responsibilities of the local authorities. They are encouraged to acquire and conduct certain trading operations which affect the interests of the whole community, especially the supply of water, of gas, of electrical energy, and of tramways. But, while in most places they do not go far enough, in others they go too far, and by undertaking the manufacture and supply of fittings, they tread upon the corns of their own ratepayers and stir up the enmity of local private interests. The electric light is the greatest boon, and it is essentially the poor man's light. Tramways, by withdrawing the working classes from the interior of towns to the more open and purer air of the suburbs, solve the question of improved dwellings, and by working these railways by electrical energy, they so reduce the cost of generation of the energy that the supply of electric light can be made the most economical source of artificial illumination. Glasgow has very strangely separated the Tramway Power House from the Electric Light Central Station, and has thus deprived its light customers of a reduction of at least one penny per Board of Trade unit. Manchester and Liverpool are wiser in their generation.

VI.—Pure Bodies.

Broadly speaking, every section of this address has reference to health. Hygiene is the most important knowledge for everyone to possess. It is perhaps the least acquired. It is not taught generally in our schools: it is not preached from our pulpits; and yet the lungs, the heart, the nerves, the skin, and the stomach are as important to our present life as the mind, and even the soul. This Institute has recognised the desirability of encouraging the teaching of hygiene in schools. It has arranged a thorough theoretical and practical examination for teachers—for those who teach must know. This matures next year. The wealth and strength of a nation rest with the health of its people. Is it not something to have reduced the death-rate 30 per cent., and to have added at the same rate to the growth of the nation?

Cleanliness is next to godliness; this is the keystone of hygiene. It promotes cheerfulness; and, after all, cheerfulness is the greatest doctor we have. Moses prescribed cleanliness above everything. Lepers were to be washed, shaven and

cleansed with blood, cedar wood, scarlet and hyssop. Their garments were to be rent and burnt. They were to be isolated outside the camp. Their houses were to be shut up, disinfected and cleaned, and even in serious cases to be pulled down, the materials removed out of the city and destroyed by fire. The leper was to put a covering upon his mouth, and on approaching people to cry "Unclean! unclean!" thus indicating that even the breath was tainted with the poison of leprosy. The Cleansing of Persons Act, 1897, is a great lever in the direction of cleanliness, but very much remains to be done, and the operations of this Institute have ever-increasing regions to attack. How far is disease carried about on clothes, and how can we best wash and dry them? Can we not utilise the electric current to bleach them? Chlorine and alkali, so much used now, destroy clothes. Oxygen not only bleaches without damaging linen and cotton, but it is an antiseptic.

An important feature of the introduction of electricity into our homes is its cleanliness. It neither vitiates the air nor deposits dirt, nor destroys gilding or curtains or the bindings of books. Reports are occasionally circulated in the press that it injuriously affects the eyes. I have never come across a single case and my experience in this direction is very extensive. If any inconvenience arises, it is largely due to the adaptation of the fittings, and to the arrangement of the lighting. There are two extremes, one where all the light glares into the eyes, the other, where all the pure brilliancy of the glowing carbon is eclipsed by coloured silks or opaque shades. The happy mean is where no incandescent filament offends the sensitive retina, but all the light is usefully and uniformly distributed about the room.

Conclusion.

The chief function of the Sanitary Institute is not only to disperse knowledge but to dispel ignorance. The resistance to progress is not so much ignorance itself, but the determination to remain ignorant. There are none so obstructive as those who will not learn. "What was good enough for my grandfather is good enough for me" is the cursed dogma of the British stay-at-home. Travelling knocks this nonsense out of him, for he sees that Americans and Germans are beating him in the race of commercial progress. The work done by this Institute is of national importance. It removes public apathy, but above all it excites enthusiasm—enthusiasm in good work, enthusiam in new discoveries, and enthusiasm in imparting acquired knowledge to benefit those who are prepared and

willing to receive it. We must never forget that every true step in advance taken by Science brings the engineer to a point from which there is no retrocession, but from which further advance is possible by himself or by someone else. Year by year these annual congresses bring our science up to date, and we drink in the well-spring of wisdom. We separate and are made better and wiser, and more able to enthuse our weaker brethren, and to distribute in ever-widening circles those waves of energy excited by the electrical influence of bright and brain-exciting intellects.

Step by step engineering progress and scientific research are bringing us face to face with the grand generalization that Nature is only another term for God, that Nature's laws are His thoughts, and that everywhere, from the infinitely great to the infinitely little, the stars in their courses and the bacteria in their operations follow one fixed and settled design.

"One God, one law, one element,
And one far off divine event,
To which the whole Creation moves."

SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

ADDRESS

By ALDERMAN SIR JOSEPH EWART, M.D., F.R.C.P., J.P.

PRESIDENT OF THE SECTION.

(Fellow).

At the outset, I have to tender to the Council of the Institute my warm acknowledgments for their kindness in having conferred upon me the honour of presiding over the proceedings of the Section of Sanitary Science and Preventive Medicine at this Congress. In taking the chair, it is my pleasant duty to accord you a hearty welcome to our meeting, and to convey to you an earnest invitation to participate freely in the discussion of the papers about to be introduced. In doing so I trust that the outcome of your labours will be the advancement of the general health and happiness of the people. Although much substantial progress has been made during the past fifty years, a good deal remains to be accomplished before our efforts are crowned with the desired success.

Of the many scientific developments which have characterised the greater part of the century now drawing to a close there are few more important than those which have been designed to raise the standard of the public health. The provision of pure water, efficient drainage of streets and houses, improved houses, the constant supply of fresh and the removal of foul air, and the widespread application of the principles of sanitary science and preventive medicine may be cited. These and many more reforms have been put in practice during the long and successful reign of the Queen; and we know that the splendid results already attained in diminished mortality and sickness have always afforded her unqualified satisfaction.

Population and Registration.—Special care has been taken to have the census made as accurately as possible. A correct census and registration are aimed at. The two are, indeed, mutually inter-dependent. The vital statistics issuing from the office of the Registrar-General from year to year demon-

strate the conditions of the general health. We learn from his last Report (1897) that the "natural increase by excess of births over deaths from the beginning of April, 1891, to the middle of April, 1897, amounted to 2,263,322; and if there had been neither emigration nor immigration this would have raised the population to 31,265,847 at the latter date. In the absence of precise information regarding these disturbing processes, the populations in the annual reports are provisionally estimated on the assumption that the rate of increase which had prevailed in the last completed intercensal period has since been maintained." On this basis the death-rate has for many years been calculated and corrected.

"The census of London which was taken in March, 1896, furnished the means of revising the estimates of the population of the Metropolis for the years 1891-96. Accordingly the populations for these years—which are shown in Table I., and are used in the calculation of the rates of marriage, birth, and death for this Report—are estimated on the assumptiou that the rates of increase had occurred (1) in London between 1891 and 1896, and (2) in the remainder of the country between 1881 and 1891, were maintained until the end of 1897. The population of England and Wales, calculated in this way, amounted in the middle of the year 1897 to 31,055,355 persons, of whom 15,047,580 were males, and 16,007,775 females. Of course, an annual census would be an ideal one, inasmuch as it would minimise error or fallacy to the greatest extent attainable. I understand that the quinquennial census for London in 1891-96 has given great satisfaction, and that it is, in intrinsic value, worth all the money expended upon it. The next census is due in March, 1901. But for London it will again be quinquennial in incidence and effect, and this might well form a precedent for adoption, when practicable, throughout England and Wales.

The Registrar-General, as we have observed, is careful at the *census* to count the people as accurately as possible, and at intercensal periods to make allowances and corrections for changes in the numbers. He does not succeed in embracing emigrants and immigrants. He does, however, pay a good deal of attention to the *married folks* and the *infants*. Thus, we find that during 1897 the marriage rate amounted to 16·0 per thousand in England. "In the twenty-eight years, 1849-76, the rate had only once fallen below 16 per thousand living, and had averaged 16·8. In the twenty years, 1877-96, the rate had only once (1896) reached 15·8, and averaged 15·1." Thus we are warned that there is a certain tendency to a falling off of the marriage rate.

In 1897 the birth rate was only 29·7 per thousand living, and corresponds exactly with the figures of the preceding year. This is the lowest rate on record, with the exception of that of 1894, when it stood at 29·6. I have thrown the facts bearing upon Births and Marriages in Table 3 (*Registrar-General's Report*) into the following form, so that their true significance may be more readily realized:—

Marriage and Birth Rate, per 1,000 Living—(ENGLAND).

Periods.	1848	1849	1850	51—55	55—60	61—65	66—70
Marriage Rate per 1000	15·9	16·2	17·2	17·18	16·6	16·78	16·42
Birth Rate per 1000............	32·4	32·9	33·4	33·9	34·36	35·14	35·28
Periods.	**71—75**	**76—80**	**81—85**	**86—90**	**91—95**	**1896**	**1897**
Marriage Rate per 1000	17·08	15·34	15·14	14·7	15·16	15·8	16·0
Birth Rate per 1000............	35·48	35·36	35·36	31·44	30·54	29·7	29·7

I am afraid that the drop in the marriage rate is rather serious. It is, it is true, partly covered by the rise in 1897. But there is a previous depression in the market, beginning in 1876 and persisting through 1896. Let us hope that the one per thousand improvement (1897) may prove a harbinger of better things to come. The falling off of the births affects the past 12 years or so. Prior to that, or from 1848 to 1881-85, a fairly good supply of births was maintained.

The *decline in the death rate* in England is briefly expressed in the subjoined statement:—

Periods.	1848	1849	1850	51—55	56—60	61—65	66—70
Death Rate per 1000	23·0	25·1	20·8	22·66	29·80	22·58	22·42
Periods.	**71—75**	**76—80**	**81—85**	**86—90**	**91—95**	**1896**	**1897**
Death Rate per 1000	21·96	20·80	19·40	18·88	18·74	17·1	17·4

The contrast between the general mortality of 1848, when the rate per thousand living mounted up to 23·0, and that of 1896, when it fell to 17·1 is very remarkable. The difference represents a reduction of 5·9. A similar comparison between the results of 1849, when the rate went up to 25·1, and 1897, when it declined to 17·4 is even more significant. This difference gives a reduction of 7·7. The steadiness of the improvement, in the national health since 1876, when the Public Health Act became the law of the land, is striking. Not even the influenza, which expended its greatest power in 1891-95, when it caused a mortality of 415·4 per million, prevented a clear fall of the general rate. And in 1896 and 1897, when influenza still prevailed, but with diminished prevalence and mortality, and caused a rate in these years respectively of 122 and 196 per million, the general death toll fell to 17·1 and 17·4 per thousand. The facts thus revealed demonstrate not only a very considerable saving of human life, but a proportionate diminution of sickness, misery and pain. They conclusively point to an additional reserve of intellectual, physical, industrial, and commercial energy to be used for the general interests of the country.

It is also pleasing to find that the soldiers and sailors of the moment are better equipped in health and strength than they were in the insanitary periods gone by. Both in the army and navy, the decline, in the death rate per 1,000, is illustrated in the following statement:—

Periods.	1858	1859	1860	1868	1869	1870	61—65	66—70
Army	......	......	......	14·2	17·4	14·6	......	......
Navy	25·8	16·17	14·7	......	......	......	13·38	12·0

Periods.	71—75	76—80	81—85	86—90	91—95	1896	1897
Army	12·22	14·38	11·64	10·22	8·62	8·40	10·0
Navy	8·64	10·38	8·26	6·94	7·10	5·3	5·2

The substantial reduction in the mortality of the British soldiers at home is largely due to better housing, better feeding, better sanitation and improved administration all round. The results in the navy are even more satisfactory and encouraging. Thus the mortality was 25·8, 16·17 and 14·7 in 1858, 1859 and

(ENGLAND.)—*Annual Death-Rates from various Causes to a Million living in Groups of Years 1861—95. Also for 1896 and 1897.*

REDUCTION OF MORTALITY.

Groups of Periods or Years.	1861—65	1866—70	1871—75	1876—80	1881—85	1886—90	1891—95	1896	1897	Reduction of Mortality per Million living.
All Causes.	22582·0	22424·6	21962·4	20971·0	19403·0	18894·6	18737·8	17101·0	17436·0	5146·0
Small-pox	218·6	104·8	410·8	78·4	78·0	13·6	20·0	18·0	1·0	217·6
Measles	456·6	428·4	373·2	384·8	413·0	468·4	407·8	603·0	434·0	22·6
Diphtheria	247·6	126·8	120·8	121·8	156·2	169·6	252·0	292·0	246·0	1·6
Scarlet Fever	982·4	959·8	758·6	679·6	435·8	240·6	182·4	178·0	147·0	835·4
Typhus	......	......	81·4	34·2	22·8	6·6	3·8	2·0	2·0	79·4
Enteric Fever	921·8	849·8	373·8	277·2	216·0	179·2	173·6	166·0	156·0	217·8
Simple and ill-defined Fever	......	......	140·2	69·2	34·2	16·6	8·0	5·0	4·0	136·2
Whooping Cough	515·8	545·0	498·8	527·0	458·6	443·6	398·4	431·0	368·0	147·8
Cholera	42·4	172·4	30·6	20·4	16·2	14·0	21·4	18·0	31·0	11·4
Diarrhœa and Dysentery	874·0	1062·8	1000·4	832·4	655·8	667·0	630·4	546·0	840·0	34·0
Hydrophobia	0·4	0·8	2·0	1·8	1·2	0·6	0·2	......	......	......
Erysipelas	87·4	82·4	105·6	80·8	82·8	54·2	47·8	36·0	33·0	54·4
Phthisis	2526·6	2447·8	2218·0	2059·8	1830·4	1635·4	1463·6	1307·0	1341·0	1185·6
Other Tubercular and Scrofulous Diseases	784·4	752·4	722·9	777·0	710·4	686·8	659·8	585·0	589·0	185·4
Old Age	1352·8	1275·8	1206·8	1072·2	1014·0	975·8	929·0	221·0	921·0	431·8
Convulsions	1258·0	1204·0	1111·2	971·4	848·0	770·0	688·4	596·0	592·0	666·0

Diseases of Integumentary System	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Accident and Negligence	**689·6**	**677·8**	**670·6**	**630·4**	**579·8**	**543·8**	**563·6**	**546·0**	**565·0**	**124·6**
Homicide	**19·4**	**19·0**	**16·6**	**14·0**	**12·6**	**11·0**	**10·4**	**10·0**	**9·0**	**10·4**
Ill-defined and not specified causes	**2207·6**	**2117·6**	**1829·6**	**1388·6**	**1140·6**	**943·2**	**838·8**	**739·0**	**748·0**	**1459·6**
Malarial Diseases	**16·2**	**10·0**	**8·4**	**7·4**	**11·2**	**6·4**	**3·8**	**5·0**	**7·0**	**9·2**
Other Dietetic Diseases	**30·4**	**26·6**	**21·2**	**25·0**	**15·4**	**11·4**	**12·0**	**11·0**	**12·0**	**18·4**
Thrush	**50·0**	**49·8**	**49·8**	**48·0**	**29·4**	**22·0**	**14·6**	**11·0**	**8·0**	**42·0**
Other Parasitic Diseases	**8·6**	**7·6**	**7·0**	**9·2**	**7·2**	**5·8**	**4·6**	**3·0**	**4·0**	**4·6**

INCREASE OF MORTALITY.

Suicide	65·2	66·4	66·0	73·6	74·8	79·4	88·6	86·0	90·0	24·8
Puerperal Fever	56·0	55·6	86·6	61·6	92·6	76·4	76·6	67·0	39·0	3·5
Other Septic Diseases	8·6	14·6	20·8	23·8	23·0	14·4	13·2	...	...	4·9
Intemperance	41·6	35·4	37·6	42·2	48·2	56·0	68·0	71·0	77·0	35·4
Organs of Special Sense	8·0	8·6	7·6	13·4	19·8	22·8	28·4	32·0	34·0	26·0
Rheumatic Fever (Rheumatism of Heart), Rheumatism	108·2	115·0	127·2	139·0	132·4	122·3	119·6	115·0	110·0	2·0
Cancer	369·8	403·8	445·6	493·6	547·6	631·6	712·2	764·0	787·0	417·2
Diabetes Mellitus	29·2	31·8	35·8	40·4	51·4	62·4	69·4	74·0	78·0	48·8
Other Constitutional Diseases	51·2	63·8	59·6	86·8	107·8	130·8	156·0	...	...	104·8
Premature Birth	392·4	406·0	416·8	472·8	475·2	507·2	562·4	564·0	573·0	180·6
Congenital Malformation	61·6	64·8	65·6	84·4	84·6	80·2	85·0	...	...	23·4
Other Diseases of Nervous System	1546·0	1605·2	1715·8	1803·2	1807·6	1779·2	1600·0	...	...	54·0
Diseases of Circulatory System	996·0	1095·8	1258·8	1415·2	1467·0	1685·8	1676·8	...	...	680·2
Other Diseases of Respiratory System	3320·6	3394·2	3685·4	3795·8	3549·4	3639·6	3677·4	3857·0	3814·0	493·4
Other Diseases of Digestive System	603·0	566·0	558·6	571·6	568·6	616·2	707	...	...	104·0
Diseases of Ductless Glands	1·8	3·8	4·4	7·6	8·8	10·8	11·8	13·0	14·0	12·2
Diseases of Urinary System	246·2	286·8	326·4	374·8	422·2	446·6	453·0	444·0	461·0	214·8

1860, but in the quinquennial period of 1891-95 and in the years 1896 and 1897, it actually fell to 7·10, 5·3 and 5·2.

By way of digression, I may say that during the last thirty years great improvements have been made in the sanitary condition of the British Army in India. The barracks are commodious and well appointed, increasing use is made of hill sanatoria. Leisure is more freely employed in outdoor and indoor recreation. Since Lord Roberts introduced arrangements for the promotion of temperance among the European soldiers in India, almost one-third of them have become abstainers. The result is a remarkable improvement in their moral and physical health, with a decrease in serious and minor criminal offences. Further, it has been observed that the abstaining soldier is capable of sustaining more fatigue and privation in active service, and that he is less severely handled by the malarious and other serious diseases of hot climates, than his comrade who may remain, however moderately, under the dominion of alcohol.

The table on pp. 352 and 353 is compiled from Tables 17, 18 and 23, in the report of the Registrar-General for 1897, and is utilized, among other purposes, to show what progress is being made in the important matter of the avoidance and prevention of avoidable and preventable diseases or systems of disease therein recorded.

The reduction of the death-rate per million living is shown in the last column of the Table by comparing the rate of the quinquennial period of 1861-65 with that of the year 1897 for many diseases and some classes of disease. It brings the contrast down to the most recent year available. It is a close approximation to accuracy and will answer well enough for the purpose I have in view. My aim is, by a ready method, to impress upon the minds of my hearers the vastness of the triumphs which have been achieved by vaccinators, sanitarians, and sanitary engineers in the advancement of health in modern days, and particularly since the Vaccination and Public Health Acts were passed in 1841 and 1876.

Small pox is a notable example. On the passing of the first Vaccination Act, in 1841, the death-rate from this pest amounted to the high figure of 576 per million living. In 1861-65, it had fallen to 218·6, and in 1897 it had dwindled down to *one unit* per million. "Vaccination, isolation, attention to rational treatment, whether therapeutic or hygienic, have preceded or accompanied, and as most people believe, induced these results; and theories which ignore vaccination as a preventive must, it appears to me, necessarily, be rejected

ntil a better explanation of the cause of the diminished incidence and mortality from the disease can be afforded." (Sir Joseph Fayrer's Address, 1898). This view is supported by the exhaustive Report of the Royal Commission on Small Pox and Vaccination, presided over by the late Lord Herschell; by the Royal College of Physicians, and the British Medical Association as voiced at Edinburgh last year in the able, well-reasoned, comprehensive, and learned Address of the President, Sir Grainger Stewart. With few exceptions, it is further accepted by the medical profession in all parts of the civilized world.

The methods of procedure adopted by the last Parliament, were an improvement on the late Acts, which were found to be inadequate. Lord Lister declared from his seat in the House of Lords, in the discussion of the new Bill that *one-third* of the children born remained unvaccinated and that *one-fourth* of the Boards of Guardians declined to put the law or the compulsory powers in practice. It is said that his lordship only agreed to a modification of the compulsory powers of the old Act on a conditional understanding that re-vaccination was to be introduced. It has, however, been omitted from the recent Act, which is to last, as it is, only for five years.

The method of compulsion by the vaccination officer independently of the guardians, has given some dissatisfaction and at Leicester the guardians altogether refuse to comply with the orders of the Local Government Board to appoint a public vaccinator. In most respects the method of securing primary vaccination has been much improved. Great care has been taken to provide and distribute an abundant supply of wholesome calf lymph. The age at which the operation may be undertaken has been materially extended, and with few exceptions it is now executed at the home of the child. The parents are relieved from reporting baby in person on the eighth day at the station. It is hoped that the many conveniences and safeguards now provided will have the effect of reconciling opponents to a preventive measure of superlative importance; and further that re-vaccination may be practised at a period of life when it is well known that the protective power of the primary vaccination has become attenuated or exhausted.

Judging from recent reports, it is pleasing to note that confidence in the preservative efficacy of the vaccine virus is in no sense really abated. That vaccination, "properly performed" and "duly repeated," is "the only known preventive of small-pox is a view which is confirmed by the experience of every epidemic, and is endorsed by those whose office it is to combat such outbreaks by all the resources of Science."

The "character of small-pox, its high degree of contagiousness, rapidity of its spread on congenial soil," says the *Lancet*, (6th August, 1898), "defy the efforts to suppress it by isolation alone, or to arrest it in its earlier days of invasion; and if vaccination were not at hand to render its remarkable aid, the disease would soon become as common and as widespread in this country as it was in times when Sanitary Science was unknown."

Personally, I have no serious misgivings as to the permanently favourable verdict of all classes of the people on this vitally important matter. I am confident that when the period comes round for the reconsideration of the entire subject that the prudence and wisdom of the country will not be found wanting in devising arrangements—somewhat changed these may probably be—for the universal continuance of vaccination, and re-vaccination—in order that the people as a whole may be protected from a scourge which, if unprevented, might again become as loathsome, disfiguring, and destructive as it was in the Middle Ages.

A reference to the Table shows that in the quinquennium of 1861-65 the death-rate from *Scarlet Fever* amounted to 982·7 per million living. It fell to 147·0 in 1897, thus giving a reduction of 835·4. It will be observed that in the three succeeding five-yearly periods the diminution was gradual, and that during the three later five-yearly periods and the two years of 1896 and 1897 the continued drop in the mortality was rapid and satisfactory. A study of the natural history of this zymotic indicates that it is not very infectious at the beginning and earlier progress, but that it is highly so during the peeling stage. This is the prevailing rule; but there are exceptions—cases in which the affection may be limited to *malaise* with sore throat, and these may often diffuse the fever without it ever having been recognised or declared. Sometimes the case is so mild that no medical advice may have been sought. It is true that in a preponderating majority of cases the disease runs a tolerably well-defined course, with the characteristic and pathognomic eruption, and with or without sore throat. Hence a diagnosis can usually be determined well before the infective stage is reached. The opportunity is therefore available to effect isolation at home where the accommodation, ventilation, and appliances, &c., are deemed sufficient, or in a special institution where such conveniences at home are not available. In both sets of cases, home antisepticism and thorough disinfection are essential.

I observe that, by some eminent sanitarians, the diminished mortality from *scarlet fever* is largely attributable to change

from a more severe to a less severe type of the disease. It will be noted that the period over which our figures extend has been, particularly in its later half, characterised by a gradually increasing development of domestic hygiene, scrupulous cleanliness, and thorough disinfection, wherever the disease has been tracked, treated or cured. Both in the homes of the well-to-do, where the means of segregation can be provided or in municipal sanitoria, more recoveries take place now than formerly, because, all the medical, therapeutical and nursing means and agencies now focussed upon the management of the case, exercise a marked influence in keeping down the mortality and maintaining at a high standard the principles and practice of Prevention and Cure. To these marked improvements, rather than to change of type, I am inclined to attribute the striking reduction in the frequency and mortality from scarlet fever. I have just had my notice attracted to a recent outbreak of scarlet fever, in an excellently appointed shepherd's house, in a salubrious mountain district, where a primipara lost her life in a few days after delivery, from infection directly introduced by a neighbour who was called in to nurse her. A sister about 18 was attacked and died in a week. A third sister was seized and lay for days in a state of prostration and semi-insensibility. She is now, however, slowly convalescing.

Down to 1870 *Enteric Fever* was incorporated in the returns of the Registrar-General with typhus and simple and ill-defined fever, although its identity as a distinct form of fever had been proved by the late Sir William Jenner, Dr. Stewart, and others many years before (1848). In the quinquennium of 1871–75 it accounted for 373·8 deaths per million, declining to 156·0 in 1897, and thus demonstrating a diminution of 217·8. That it is spread chiefly through water, milk, shell-fish contaminated by excreted filth from patients afflicted with the disease, is supported by overwhelming evidence. Hence the decline of the death-rate effected by drainage, main and domestic, of the most efficient character attainable, improved hygiene, and the consumption of pure drinking-water, assisted by the vigilant operation of the notification law. The more watchful application of the Food and Drugs Act, especially in the larger centres of population, has lessened the frequency of milk outbreaks. The same efficiency in guarding our water supplies against the *causa causans*, the reputed microbe, will doubtless result in still greater decrease of this insidious and dangerous enemy.

It has been noticed that though the utmost care has been taken by physicians and medical officers of health in endeavouring to trace the sources of origin of cases of enteric

fever with considerable success, there is often a large balance of cases which cannot be identified as spreading through the recognised channels of communication. On this point Dr. Newsholme says :—" It has been a source of disappointment to the authorities of many great towns that the provision of unpolluted drinking-water and the construction of main sewerage works and of water-tight house drains, which free the subsoil from contamination, have not been followed by so great a reduction in the mortality from enteric fever as might have been expected." Sharing in his disappointment, the Brighton Sanitary Authority have " eliminated cases of enteric fever caused by contaminated water; they have not had in recent years any cases traceable to contaminated milk. The majority of the house drains in the town are completely water-tight, and the subsoil is thus kept free from contamination which favours the continued vitality of the typhoid organism within it. Notwithstanding these facts, they find that although the amount of enteric fever is low in Brighton, they still suffer from more of this disease than they had reasonable grounds to expect, having regard to their large expenditure on the sanitary improvement of the town."

In India a tradition has descended from ancient times to the effect that uncooked shell fish are responsible for bowel affections, and more especially for attacks of sporadic cholera. In 1880 Sir Charles Cameron, C.B., the talented and eminent Health Officer of Dublin "pointed to the possible relation of typhoid fever, another 'water-borne' malady, to the consumption of specifically polluted oysters in the famous city." Sir Richard Thorne Thorne, K.C.B., says that " in the Report on Cholera in England in 1893, which I had the honour of submitting to the Board in December, 1894, I expressed my conviction that the distribution of shell fish from Cleethorpes and Grimsby as a centre had been concerned in the diffusion of scattered cases of cholera over a somewhat wide area in England."

With regard to the part which impure oysters and other shell fish play in the dissemination of typhoid fever, Dr. Arthur Newsholme, the distinguished Medical Officer of Health for Brighton, after declaring that the causes of enteric fever have probably been more thoroughly investigated than those of any other single disease, and that the contagium of the disease is recognized as being derived from the excreta of patients suffering from it, either directly in connection with the nursing of such patients, or indirectly in a more remote manner, states that the chief indirect means by which infection is communicated are—(1) " Emanations from defective drainage arrangements or

from a subsoil which is chronically contaminated by the typhoid organism, this organism being able to live and multiply in a sewage contaminated subsoil. (2) Contamination of water or milk by dejecta derived from enteric fever patients. (3) Contamination of shell fish or other foods by dejecta from enteric fever patients."

As to cases not springing from the ordinarily accepted sources, Dr. Newsholme has unremittingly devoted, in the public interests, his best abilities and energies to solve the question of the real origin of these cases during the past six years, 1894-99. He has, by a great accumulation of irrefragable testimony, proved that the percentage of cases of typhoid fever in Brighton traced to the consumption of sewage contaminated oysters and other shell fish in 1894, 1895, 1896, and 1897, amounted to 38·2, 33·9, 31·8, and 30·7 respectively. Confirmation of the soundness of these investigations has been furnished by Sir William Broadbent, F.R.S., in the *British Medical Journal* (1895), Vol. II., p. 61, and Sir Peter Eade in the same journal (1895), Vol. II., p. 121, and many others. The classical report of Dr. Bulstrode to the Local Government Board has materially emphasised their weight and importance. The facts recorded in this report as to the cases of the oyster ponds at Southend, Cleethorpes, Medina River, Penryn River, Brightlingsea Creek, Southwick and Colne River, and in the cases of certain storage pits and other receptacles at Southend Pier, Blackwater River, Wevenhoe, Grimsby Fish Dock, Poole, Warush, Bosham and Emsworth show that, in all these instances, the oyster ponds or receptacles are subject to sewage contamination of the grossest and most dangerous description.

At page 82 of the report, the case with respect to sewage-contaminated oyster beds and storage ponds is summarized in the following words:—

"It must have been apparent from these descriptions and maps that at certain places along our coasts, no care whatever has been exercised in the selection of localities for layings serving as fattening beds, and for storing ponds, in order to ensure that oysters in these places should be reasonably free from risk of sewage pollution; and also it will be clear that considerations of accessiblity and convenience have, in many instances at least, determined the selection of storage ponds, fattening beds and layings. A general view of the conditions will have served to demonstrate that many of the larger and more important oyster companies possess 'layings,' fattening beds and storage ponds in the main free from risks of dangerous sewage pollution; and that, moreover, where security in this

sense does not obtain, it may in not a few instances at least, be easily brought about by the simple expedient of altering the position of the fattening beds, or storage pits. But on the other hand, it will have been obvious to the reader that there are cases where the risk of sewage pollution to oysters is so great, and so undeniable, that nothing short of complete diversion of the sewers or drains, or withdrawal of existing fattening beds or ponds from use, can be regarded as satisfactory in the public interest. It would indeed appear that, in several places along our coasts the conditions are at least equally bad, if not worse than those which are reported to have brought about the very remarkable outbreak of enteric fever at Wesleyan College, Connecticut, U.S.A."

On the 7th December, 1894, a deputation from the Brighton Town Council waited upon the Parliamentary Secretary of the Local Government Board, Sir Walter Foster, who was accompanied by Sir Hugh Owen and Sir Richard Thorne Thorne, K.C.B. At this interview Sir Walter Foster stated that "he regarded the site under complaint where the oyster ponds were now placed as an open sewer, and absolutely unfit for its present use." He added that "there was no doubt that the question was one of great importance, and that some general regulations for the control of the trade in shell-fish were necessary." The Medical Officer of Brighton persisted in his exhaustive investigations.

In the Session of 1896 the Brighton Sanitary Authority endeavoured to obtain Parliamentary powers to enable them to prohibit the sale, within the Borough, of shell-fish known or suspected to be the cause of infectious disease. This proposal was rejected, "largely, it is believed, because of the statement of the Local Government Board that their investigation on the subject was incomplete, and because of the announcement of the Board of Trade that powers of the nature asked for, if granted, should be general, and not local." Rather late in the Session of last year an influential deputation, supported by medical officers and others from many municipalities throughout the country, waited upon Mr. Chaplin, President of the Local Government Board, and urged the pressing necessity of the earliest attainable legislation on the subject of unwholesome oysters and other shell-fish. Mr. Chaplin admitted the impregnable strength of the case as put by the Brighton and other authorities, and expressed his readiness to deal with the important question at an early opportunity. In fulfilment of this pledge, Lord Harris, on the 9th of May, introduced an Oyster Bill into the House of Lords. The Bill is entitled "An Act for the Protection of the

Public Health against Dangers arising from the Consumption of Unwholesome Oysters." It consists of nine clauses, and its provisions are briefly explained in the July number of *Public Health* (p. 682). The Bill ought also to have dealt with unwholesome mussels and other shell-fish. The Bill was withdrawn.

In the quinquennium of 1861-65 the mortality from *Phthisis* mounted to the large figure of 2526·6 per million. In 1897 it dropped to 1341·0. The difference between these figures represents a saving of 1185·6 per million. The reduction is chiefly due to better housing of the people, now affording improved lighting, and freer circulation of fresh air, advanced sanitation and hygiene, a general distribution of wholesome drinking-water, and better food. The improved conditions in workshops, factories, unhealthy occupations, and of the workers themselves, have something to say to this result. Thus we find that a majority of the population in England and Wales belong to the wage-earning classes, who have most highly benefited by the improved developments referred to. Sir R. Giffen states that "while the workmen's wages have advanced, most articles he consumes have rather diminished in price, the change in wheat being specially remarkable, and significant of a complete revolution in the condition of the workers. The increased price in the case of one or two articles—particularly meat and house rent—is insufficient to neutralise the general advantages which the workman has gained.*

As regards the housing of the working classes, the *Daily News* and others have shown that overcrowding and consequent demoralisation are still crying evils in the poorer quarters of most of our large towns. That is still one of the most important questions of the period. The wide-spread development of this reform will largely contribute to maintain in progress the further decrement of the sickness and mortality from phthisis and other tubercular and scrofulous diseases.

It has been recently stated that, "according to recent calculations, there were half a million of consumptive people in the country." (Dr. C. Heron). That the disease is communicable in a certain degree has long been suspected. The discovery of the *bacillus tuberculosis*, by Professor Koch, seventeen years ago, has placed this character of the disease beyond question. The *contagium* is not discharged through the medium of the breath. It abounds in the expectoration. Luckily it is only infective to a minority of the population. But this comparatively moderate power of infection may, as suggested by Newsholme, possibly be counterbalanced by its prolonged infectiousness, differing in

* "Progress of the Working Classes in the last Half Century," by Sir R. Giffen, F.R.S. (*Inaugural Address*, Statistical Soc., Session 1883-84).

degree and in this respect from measles and scarlet fever. Although, as pointed out by Ransome and others, "the tubercle bacillus can subsist on artificial media and even on wall papers, at the ordinary temperature of certain rooms," its extra corporeal or saprophitic existence is comparatively slender and restricted. Unlike the typhoid organism which germinates and grows apace in sewage impregnated soil the bacillus of tubercle can never be similarly omnipresent in such soil. The residuum of cases that may be regarded as originating in this way must be very small. But this exceptional saprophitism does not explain the vast majority of cases of phthisis. These are, doubtless, propagated in man simply by the breathing of air charged with the specific bacillus arising from the desiccated sputum of consumptive persons.

The *National Association for the Prevention of Consumption* recommend the universal distribution of instructions couched in plain and simple language, to be frequently repeated, with a view to impress upon all people the necessity of preventing the effective bacilli from reaching the lung cells, during respiration, in the form of dust. To secure this object all sputa derived from consumptives are to be collected in special spittoons or other receptacles and destroyed before becoming dry and dusty; that rooms which have become unwholesome or infected in which patients have been registered as having died from phthisis, should be thoroughly disinfected, and that special hospitals be organised mainly for the cure of the disease by a liberal application of open-air treatment, to be supported as voluntary, or, in some instances, maintained in part or entirely as self-sustaining institutions.

The very existence of these hospitals, both in the in- and out-patient departments would doubtless constitute active centres of education, cure, and prevention in proportion to their numbers and size. When, however, it is reflected that the total number of persons so cared for would not, at the most extravagant estimate, account for more than a modest or limited portion or mere tithe of consumptives abounding in the country, it must be manifest that the proposals of the Association do not adequately grapple with this important subject. It is true that in these hospitals education, cure, and prevention would proceed voluntarily *pari passu*, and that in the homes of registered deaths, a certain amount of prevention would be accomplished also voluntarily. So far as such cure prophylaxis or relief are concerned, I have not a word to say against the suggestions of the Association. But what I desire to say here is that these in the aggregate may be regarded as important skirmishes preceding a general action, which, to be effective

and decisive, and as quickly executed as possible, should be waged in real earnest all along the line, until the enemy is vanquished or extinguished.

We are now fully acquainted with the natural history of the *Bacillus tuberculosis* and the forms of tubercular disease produced by it. Its sphere of operation is, so far as is known, almost exclusively intra-corporeal. Its escape is, in the case of phthisis, only through the medium of the expectoration, and, in the course of tabes mesenterica, by the alvine discharges. To destroy these organisms by disinfection or burning, before any of them have, whilst retaining their vitality unimpaired, been dried and mixed as dust with air about to be breathed and thus prevent the entry of original supplies, or fresh re-inforcements of them into the lung cells, is the simple problem to be solved. A part of this preventive work is to be done as suggested by the Association and some is already being carried out by a few officers of health on their own responsibility. Thus, Dr. Newsholme, in the six years ending 1898 caused 573 rooms to be cleansed, purified and disinfected in Brighton wherein deaths from phthisis had been registered. Drs. Niven and Paget, in their respective spheres have been operating in the same direction. This good work has been done without government recognition. But how small in comparison with what might and ought to be done by State control! Yet we are asked by the Association to restrict our sanction to a series of proposals, which, in their aggregate, only deal voluntarily with the fringe of the subject, leaving by far the greatest portion of it in abeyance or untouched. When a few years ago the Prince of Wales was told at a great sanitary meeting at St. James's Hall, that the sickness and mortality caused by certain zymotic diseases could be prevented, His Royal Highness rightly exclaimed—"then why are they not prevented"? So we are now informed on every hand that tuberculosis, which has always struck with mortal effect at the lives of the flower of the population, can be prevented with much greater ease and certainty than most of the notifiable diseases, and we naturally want to know why they are not to be prevented by all the weapons which can be placed at our command?

With a view to accomplish this essentially important object, in addition to the dissemination and application of the suggestions of the National Association, the Local Government Board should at least "*allow the same local option in respect of the notification of phthisis as of diseases at present allowed to be added to the schedule of notifiable diseases.*" The existing Infectious Diseases Notification Act was introduced as a permissive Act only ten years ago (1889). After having been

almost universally adopted and gratefully appreciated, it has just been made compulsory. Surely this ought to be regarded as sufficient justification for granting local option in respect of the notification of phthisis. The objections put forward by the Local Government Board against the notification of phthisis are in great measure the same stock objections that were for a long time used to oppose the present Act before it was made law. There is not one of these which is really tenable. When it is borne in mind that—the phenomenal reduction in the mortality from phthisis notwithstanding—"the death-rate from the disease is still 50 per cent. greater than that of all the seven chief zymotic diseases put together, and is much more capable of being prevented than are several of them, is it not passing strange that this—the most destructive form of tuberculosis—stands at the present moment, by the refusal of the Local Government Board, outside the official action or cognisance of the guardians of the public weal?"

The bacillus tuberculosis unfortunately does not confine its destructive operations to phthisis. It is responsible for the causation of *tabes mesenterica*, *tubercular meningitis* (acute hydrocephalus), and several expressions of *tubercular* disease in glands, joints, and other important structures in different parts of the body. This group, known as "*Other Tubercular and Scrofulous Diseases*," produced a mortality of 784·4 per million in 1861–5. and 589 in the year 1897; thus indicating a saving of 185·4, a proportion of reduction of mortality which is far short of that demonstrated in the comparison of the results of phthisis during corresponding periods (see *ante*). The cases represented in this group (and indeed in phthisis) mainly occur among the very young, and youths and girls of tender age, in insanitary, overcrowded, ill-ventilated, dark, and damp localities and so-called homes, and fed on food often inferior in quality, and too frequently insufficient in quantity. Under such evil environments the bacillus is swallowed in contaminated milk or other forms of food; and passing unscathed an attenuated and inefficient gastric juice, it may gain ready access to the intestinal and mesenteric glands, the membranes of the brain or other parts, affording, under such circumstances, a suitable nidus for its development, growth, extension, and multiplication. Hence the fatal character, though slow in progress, of many of these varieties of tubercular disease. The measure of prevention is to be found in the systematic destruction of the diarrhœal discharge of tabes, efficient control of the milk supply, and the strictest supervision under the Food and Drugs Act; the universal application of the tuberculin test, and so

to ensure the protection of milk against contamination with tubercular bacilli; and the general construction of abattoirs; and through the proper organisation and working of such important institutions, as is daily done at Carlisle, under the direct inspection of the able Health Officer, Dr. William Brown, with a view to secure the absolute purity of the meat consumed.

Space and time equally interfere with my dealing even in limited detail with more of the diseases or classes of disease portrayed in the statement before us. It will be observed that the death rate of a considerable proportion of these diseases has been materially diminished, such as that of typhus, simple and ill defined fever, whooping cough, cholera, erysipelas, old age, convulsions, croup, dentition; diseases of the liver, the organs of generation, parturition, locomotion, integumentary system, accident and negligence, homicide, ill defined and not specified causes, malarial disease, thrush and other parasitic diseases. Against many of these maladies, sanitary science and preventive medicine are evidently fighting a winning battle. Thanks unstinted to the immortal Jenner and to the perseverance of his successors, the results demonstrate that with such a continuance and extension of vaccination as increasing confidence on the part of the public is, I hope, fast engendering, and also in good time, the general adoption of the practice of secondary vaccination, fatal small pox will ere long be regarded by a grateful public as one of the diseases of the past. In the lifetime of many of us, typhus has been all but extinguished; a hale, hearty and enjoyable old age has been much lengthened, and malarial fever at home at least has been marvellously curtailed. It is gratifying in spite of all the increasing consumption of drink going on that homicidal people are a diminishing quantity. There is room for more decrease. It is to be regretted that all our sanitation and prevention have made so small an impression on measles and diphtheria.

Below the words "Increase of Mortality," of the Table on which I have been commenting, the eye comes first upon the word "Suicide," showing an increment in numbers of 24·8 per million. Passing on, the increase in the mortality per million mounts up to 35 in puerperal fever, 4·9 in other septic diseases, 35·4 in intemperance, 33·2 in diseases of the organs of special sense, 2·0 in the class of rheumatic fever (rheumatism of the heart) and rheumatism, 419·2 in cancer, 48·8 in diabetes mellitus, 105 in other constitutional diseases, 180 in premature birth, 23·4 in congenital malformation, 54·0 in other diseases of the nervous system, 680·2 in diseases of the circulatory system, 493·4 in other diseases of the respiratory system, 104 in other diseases of the digestive system, 12·2 in

other ductless glands, and 214·8 in other diseases of the urinary system.

The upward movement of *the average expectation of life* is shadowed forth in the following statement of the *Registrar General's Decennial Supplement*, part II., p. cxlv., distributed in six life tables, over several life periods.

Life Period.	Age-limits of Period.	Length of Period in Years.	England and Wales.			Manchester Township.	Selected Healthy Districts.	
			1838-54	1871-80	1881-90	1881-90	1849-53	1881-90
			MALES.					
Infancy	0—5	5	3·94	4·01	4·02	3·51	4·29	4·30
School Age	5—15	10	6·92	7·11	7·35	5·95	7·88	8·13
Adolescence ..	15—25	10	6·51	6·79	7·12	5·55	7·50	7·89
Maturity	25—35	10	5·95	6·29	6·69	4·90	6·95	7·49
	35—45	10	5·31	5·62	6·04	3·89	6·37	6·95
	45—55	10	4·54	4·76	5·16	2·71	5·72	6·25
	55—65	10	3·55	3·63	3·96	1·51	4·82	5·22
Decline	65 & upwards	...	3·19	3·14	3 32	0·76	5 03	5·25
Total	All Ages	...	39·91	41·35	43·66	28·78	48·56	51·48
			FEMALES.					
Infancy	0—5	5	4·07	4·14	4·17	3·71	4·39	4·43
School Age	5—15	10	7·19	7·40	7·68	6·32	8·07	8·41
Adolescence ...	15—25	10	6·73	7·07	7·44	5·92	7·61	8·12
Maturity	25—35	10	6·12	6·58	6·99	5·35	7·00	7 69
	35—45	10	5·46	5·95	6·38	4·50	6·37	7·15
	45—55	10	4·73	5·20	5·63	3·42	5·71	6·53
	55—65	10	3·82	4·21	4·55	2·16	4·89	5·60
Decline	65 & upwards	...	3·73	4·07	4·34	1·29	5·41	6·11
Total	All Ages	...	41·85	44·62	47·18	32·67	49·45	54·04

Dr. Tatham states that "the average life-time of *Males*, or the expectation of life at birth, which had been 39·91 years by the first of the three (national) life tables, and 41·35 by the second, is further increased by the life table to 43·66 years; that is to say, a male exposed throughout life to the rate of mortality obtaining in England and Wales in 1881-90, would on an average live 2·31 years longer than he would have lived had he been subject to the rates prevalent in 1871-80, and 3·75 years longer than he would have lived had he been subject to the rates prevalent in 1838-54"; and "that the average expectation of *Females*, at birth, which had been 41·85 years and 44·62 years respectively in the earlier tables, is further increased by the new table (1881-90) to 47·18." It will be

noted, on a comparison being made between the three national life periods under review, that the expectation, or capital of life has increased of all age periods, "and not only at the earlier age periods, in which the chief reduction of the death-rate has occurred." (Newsholme, *Vital Statistics*, p. 308. New edition).

Dr. Tatham gives a useful summary of the foregoing table in the following interesting statement :—

		England and Wales.			Manchester Township	Selected Healthy Districts.	
		1838-54	1871-80	1881-90	1881-90	1849-53	1881-90
Average lifetime between 15 and 65 years of age...	Males...	25·86	27·09	28·97	18·56	31·36	33·80
	Females	28·86	29·01	30·99	21·35	31·58	35·09
Percentage of the entire age-period of 50 yrs., 15–65	Males...	52	54	58	37	63	68
	Females	54	58	62	43	63	70

The age 15 to 65 may be fairly regarded as representing "the effective or working" period of life. It is during this period that most of the best mental and physical work is performed. It is, therefore, satisfactory to find that both men and women have had a greater stock or capital of life during those 50 years of life, in 1881–90, than in either of the earlier life-tables. It also comes out from an examination of the figures of the whole of the six life-tables that the average proportion of time lived by *men* between the ages of 25 and 55 differs very little from 40 per cent. Dr. Tatham adds: "It follows that in each of these six life-tables about 60 per cent. of the average life-time is lived partly before 25 years of age and partly after 55 years of age; and the distribution of this 60 per cent. between the earlier and the later ages would therefore enable us to distinguish between life-tables for healthy and unhealthy districts or periods without referring to the respective mean life-times."

According to Dr. Tatham's account of the English Life Table for 1881-90 there was "no further increase in the adult death-rate, although persons over the age of 45 only shared to a slight extent in the marked decline in the death-rate at earlier ages, which had been showing itself. In making the comparison between 1886-90 and 1891-95, at twelve age periods in groups of years for England and Wales, Dr. Newsholme has shown that there had been little variation. Practically, the

death-rate had been stationary. But it would have been more in favour of adults if there had not existed, during the whole of the quinquennium of 1891-95, a wide-spread epidemic of influenza. When comparing the death-rate, at different periods of life, during the eighth and seventh decades of the century, Dr. Ogle had shown that "speaking generally, the death-rates fell for the earlier age periods, while they rose for the later periods of life." The male death-rate being higher than in the preceding decennium at each period after 35 years of age, while the female death-rate did not show an increase until after the 45 years of age.

Much discussion has arisen regarding the disparity of the death-rates in 1871-80 and the preceding decennial periods regarding the earlier and later periods of life. The object has been to furnish arguments to explain why the adult death-rate in 1871-80 had been so much higher than in previous decennial periods. In 1893 Newsholme * favoured us with his explanations and arguments in support of them. Since they were written valuable confirmation by the statistics of another decennium, 1881-90, has been afforded. "The decline in the death-rate, which, when the eighth was compared with the seventh decade, stopped short at adult life, has now extended to nearly every period of life in both sexes, though it is but small in amount after the forty-fifth year of life." As further experience is sure, in my humble opinion, to complete that confirmation, I venture to quote these explanations in full:—

"(*a*) A favourite explanation of the increased death-rate and diminished expectation of life in adult years is that, owing to the saving of life in the earlier years of life—a saving which has been especially in zymotic diseases and phthisis and other tubercular diseases—there has been a large number of weakly survivors, who would under the former *régime* have been carried off by these diseases. In other words, the operation of the law of the survival of the fittest has been impeded, with result unfavourable to the health and vigour of adult life. This argument assumes that weakly children are more prone to attack of infectious diseases than robust children, an assumption which experience does not confirm. These diseases appear to attack the majority of children, weakly or robust, who are exposed to their infection. It might be reasonably expected, therefore, that with a decrease in the total deaths from infectious diseases there would have been at least a corresponding decrease in the number of those who are left maimed by an attack of one of these diseases to survive to adult life. We personally thi

* "Brighton Life Table," p. 25, *et seq.*

that the weeding out of weakly lives, caused by the greater mortality among weakly children suffering from an infectious disease, is almost entirely counterbalanced by the greater number of children made weakly in former times by non-fatal attacks of an infectious disease.

"The case for deterioration of the race by survival of patients who would formerly have died in early life from phthisis and other tubercular diseases, appears to be a stronger one. It is probable that a larger proportion of phthisical patients are cured than formerly. It is probable also that many more children with a strong tendency to phthisis, or even suffering from its early symptoms, are prevented by the improved medical treatment and the improved social conditions of recent years, from developing the disease. These now may survive to adult life, and become the parents of children with a strong tubercular tendency.

"Such a fact need not, however, cause any serious apprehension for two reasons. In the first place, hereditary tendencies to phthisis only act under favourable predisposing conditions, such as damp and over-crowded houses, sedentary occupation in a cramped position, &c.; and in presence of the active exciting agent, the specific *bacillus tuberculosis*, introduced *ab extra* by inhalation or by means of food.

"(*b*) Assuming that more phthisical patients survive than formerly, is it not equally true that fewer persons *become* phthisical than formerly? With a diminution of the active cases of phthisis, the number of centres for phthisical sputum, which as dust, is the chief cause of subsequent infection, must have diminished to a corresponding extent. Of the fact that the predisposing causes of phthisis—damp and over-crowded houses, ill-ventilated workshops, etc.—are steadily diminishing, there is evidence on every hand. It is, therefore, reasonable to suppose that much at least of the deteriorating effect of survival of tubercular persons is counterbalanced by the large number of persons who are *prevented by improved sanitary and social conditions from becoming tubercular.*

"It is premature at present to attempt by statistical means to determine how far the counteracting influences which are at work, balance each other, or failing a balance on which side is the preponderating effect.

"(*c*) The increased stress of modern life is supposed by many to explain the increased death-rate among adults. It is doubtful if such increased strain exists in the community as a whole. Each adult as he becomes year by year more deeply involved in the battle of life comes to the conclusion that the general strain of life in the community is increasing, forgetting that the same

causes operated as life advanced in previous generations. There is reason for thinking with Dr. Pye-Smith that much of the evil ascribed to 'over-pressure' is really due to over-feeding and drinking.

"Assuming, however, that over-pressure exists in certain stations of life, *e.g.*, among city merchants, medical men, etc., it cannot be said to exist generally among professional men. Clergymen, lawyers, and civil servants are as classes long-lived.

"Even assuming that over-pressure exists throughout the whole of the professional and mercantile classes, these do not form the mass of the community. *The majority of the population of England and Wales belong to the wage-earning classes*, and the conditions of these classes will therefore necessarily have the greatest influence on the total result. What are the facts as regards these classes? They may be gathered from an important address by Mr., now Sir R. Giffen. He shows that the wages of the agricultural labourer have increased, while his hours have decreased. In the textile, engineering and house-building trades, he shows that the workman gets from 50 to 100 per cent. more money than fifty years previously for 20 per cent. less work. He sums up in the general statement which is quoted on p. 361.

"The conditions of housing of a large proportion of the wage-earning classes are still unsatisfactory, and leave ample scope for improvement, though they have immensely improved as compared with fifty years ago. It must also be admitted that there is a considerable (though probably a diminishing) residuum who are not included in the general improvement described by Mr. Giffen.

"There are two other circumstances affecting the life of the community which must be considered in this connection. These are the effects of increasing 'urbanization' and the associated increase of manufacturing (and largely indoor) occupations as contrasted with agricultural and outdoor occupations.

"At the census of 1861, 37·7 per cent. of the total population of England and Wales was rural; at the census of 1881 this proportion had decreased to 33·4 per cent., and at the census of 1891 to 28·3 per cent. The urban death-rates are generally higher than the rural, though the former have shown a greater reduction in recent years than in the latter. It is impossible to deny *in toto* that the conditions which go to form the sum total of urban life are less favourable to a healthy adult existence than those of rural life, though no attempt can be made at present to estimate the share of the increased number of the urban population in say 1871-80 as compared with 1838-54, in producing the higher adult death-rate at the more recent period.

"(*d*) Another consideration requires to be borne in mind. We are at present in a transition period. The Public Health Acts of 1871 and 1875 heralded immense improvements in sanitation, the fruits of which have not even yet been fully reaped. There has been, more especially since 1875, steady and increasing improvement in the conditions under which people live. Men now 40 years of age were born in the pre-sanitary period, and the first 20 years of their life were spent under more unhygienic conditions than those now holding good. This fact would go far towards explaining a stationary death-rate at the higher ages. It does not, however, explain an increased death-rate at those ages.

"The explanation of this increased death-rate at the higher ages will probably be evident when at the end of another twenty or thirty years the improved conditions of life have endured sufficiently long to enable their full force and value to be determined. We must be content in the meantime to have stated the more important factors which appear to be at work leaving the complete solution of the problem to a time when the statistical experience of our country is more mature."

The past history of the health of our country shows that, owing to the wretchedly bad housing, defective drainage, unwholesome food, intemperance and total disregard of cleanliness and sanitation, it was, from time to time, decimated by black death, sweating sickness, typhus, plague, small-pox, leprosy, scurvy, malarial fevers and dysentery. Such was the condition of things in the reign of Elizabeth. With a highly prosperous population of England and Wales in the middle of 1897, standing at the handsome figure of 31,055,355 persons, and a well organised, equipped, and advancing system for the promotion of "the cleanliness which is next to godliness" in full swing, we find that a goodly proportion of these pests have either been extinguished or immensely minimised in incidence and severity. There is, however, no absolute certainty that this immunity will be permanent unless these conditions are fully maintained. The remarkable and extensive diminution of sickness and mortality, illustrated in the analysis of the vital statistics during the Victorian Era, is further substantial encouragement to us "to go on and prosper" in the same direction. The plague apparently approaching our shores is a signal, warning us never to cease in our watchfulness in order to secure the safety of our commanding position, and to have all the weak places in our armour, in town, country and seaport, promptly dealt with and strengthened. It has, during the past few years (five or six), travelled, chiefly by existing sea routes, from its home in China and gained a footing in

Bombay, Poona, Kurrachee, and many other parts of India; the Mauritius, Madagascar, Alexandria, in some other parts of North Africa, and Oporto in Portugal. Provided its vigour and vitality are retained sufficiently long, we may hear of it yet making its way, slowly but surely, through Persia and Central Asia into Turkey and Russia in Asia, eventually reaching Europe by the great land trade routes. In 1893 our new system of preventing the spread of cholera by inspection, individual isolation, rigid sanitation, and hygiene applied to every case that presented itself, succeeded in stopping the progress of the pest, at a time when many towns on the Continent were, so to speak, decimated in defiance of the coercion or quarantine in vogue in these communities. Even at Grimsby, where it was most threatening, it was put down, proving, as it had often done before at other places, that absolute all-round cleanliness, promptly and vigorously applied, was sufficient for the purpose. So with regard to this travelling Bubonic plague, should it be imported, there is every reason to believe that its spread in this country will be successfully prevented by the vigilant application of the same system, promoted, guided, and guarded by Sir Richard Thorne Thorne and the sanitary authorities, medical officers of health, and sanitary inspectors throughout the country.

The Science of Bacteriology is now constantly being brought into requisition for sanitary, diagnostic, curative and immunising purposes with beneficial results, and undoubtedly has a splendid future before it. Speaking at the anniversary dinner of the Royal Institute of Public Health, Lord Lister said "that the efforts which were now being made to exterminate consumption were entirely guided by the results of bacteriological study. The deaths from diphtheria had been reduced to zero by the help of that study, and, as regards cholera, inoculation had saved travellers in infected places from the effects of the disease. He hoped that those ignorant persons whose protestations against bacteriological research were the loudest, would bear these undeniable facts in mind." In this connection, Behring's serum therapeutics should be borne in mind. The experiments of Pasteur on the attenuated vaccine for anthrax in cattle are well known and appreciated.

To Pasteur and Koch we are indebted for demonstrating "the part that living agents play in the causation of disease and the methods whereby these might be investigated," thus laying broad and deep the foundations of Bacteriology. Preventive medicine has been enriched by the discovery of chloroform by Sir James Simpson, and by the antiseptic treatment of wounds by Lord Lister. The suggestion of Sir

Douglas Powell that, in all suitable localities, there ought to be supplied a well appointed and equipped Bacteriological Laboratory, to be used for the purposes of diagnosis, sanitation and hygiene is welcome and timely.

In conclusion, I desire to say a few words on the latest phase of the important question of the malarious parasite. We learn from Major Ross that the association of the mosquito as the cause of malarial fever has been urged for a hundred years, among others, more recently by Laveran and Professor Koch, and that "in 1894 Dr. Patrick Manson first expounded his famous theory that the malarial parasite requires a suctorial insect for its further development." Dr. Ross began the investigation thus suggested, in India, in 1895. "In August, 1897," he says, "I first succeeded in cultivating the parasite of malaria in two species of mosquito; and in August, 1898, the development of one of the parasites of birds in the mosquito had been worked out, and healthy birds had been infected by the bites of infected insects, thus completing the life cycle of these organisms." This brilliant discovery has been confirmed by Dr. Daniels, Professors Gressi, Bignami, Bastianelli, Koch, MacCallum, and accepted by Dr. Manson, Ray Lankester, Laveran, Mitchenkoff, Nuttale, and Mesnil. The host may be anyone of three varieties of Anopheles Maculopennis. As they breed only in small puddles, and the larvæ take about seven days to arrive at maturity, it is thought that if persons in towns and villages could be prevailed upon to cleanse these breeding grounds every seven days, or fill up such as can be dispensed with, the insects would, therefore, be destroyed, and the malarial fever caused by them would, at the same time, be prevented. If future investigations confirm this view, it will be possible that, by the repression of these puddles, towns and villages in tropical and tropoidal countries would be freed from the malarial parasite and malarial fever. A cablegram from Major Ronal Ross, head of Malaria Mission, West Africa, dated Sierra Leone, 29th July, announces "Malaria mosquito found."

SECTION II.

ENGINEERING AND ARCHITECTURE.

ADDRESS.

By ALDERMAN JAMES LEMON, J.P., M.Inst.C.E., F.R.I.B.A., F.S.I., F.G.S.

PRESIDENT OF THE SECTION.

(Fellow).

I have to thank the Institute for placing me in the Chair of this Section for the second time.

When I occupied this position at the Congress at Portsmouth in 1892 I dwelt more particularly upon those questions which I thought would interest the town which had done the Sanitary Institute the honour to entertain its members.

To-day I am in my own borough, and I can afford to take a wider view.

Engineering and architecture cover such a large field, that I cannot in a brief address do full justice to these subjects; I can only refer to those branches of thought and practice which more particularly refer to the maintenance of the public health.

Pure Water.—The supply of pure water to our towns an[d] villages claims the first attention of sanitarians, as it is necessity of life, and without it various diseases are generate[d].

The question as to a constant versus an intermittent supp[ly] has been fought and won, and although in some towns a[nd] districts, the water supply is intermittent, the almost univer[sal] opinion is in favour of the constant system.

This change has swept away the storage cistern with all abominations, and the householder of to-day knows that if water is not pure, it does not arise from defects in his ho[use] but from the source of supply and defective distribution.

There is no difficulty in this country in obtaining a suffic[ient] supply of water, one of the predecessors in this chair, Mr. I Angell, in his address in the year 1897, stated that it sufficient for twenty-five times the then population. Bu[t] raising of the standard of purity and increase of popu

has led to a scramble for a better source. Birmingham has gone to Wales, the London County Council wish to follow their example.

How far this race from one part of the kingdom to the other, on the part of the wealthy corporations should be permitted, is a matter of serious consideration by Parliament. It may be desirous to allocate the areas of supply to certain districts, so that it may not become a question of "first come first served," and the longest purse.

The reduction of waste, thanks to Mr. Deacon, has been of great benefit to the public health.

Local Authorities and water companies are now enabled to give a contant supply to every house in their districts, and keep the quantity per head within reasonable limits.

The supply of water per head in this borough, since the introduction of waste-water meters, and by the relaying of mains, has been decreased fifty per cent., viz: from fifty-six gallons to twenty-eight gallons, and yet no resident will say he has not all he requires.

I do not wish to tread on the toes of Water Companies, but I cannot help expressing a strong opinion, that the charges for Baths and extra water closets, are taxes upon the Public Health, and should be prevented by Act of Parliament.

If the statutory rate is not sufficient to include these charges, let the rate be increased accordingly.

The Corporation of Southampton make no extra charges whatever, except for Garden Hose, and they give a constant supply of softened water for the rate of 10d. in the pound upon the rateable value.

As to the sources of water supply, I believe we shall see great changes in the near future; Maidstone has taught us a useful lesson, and rivers are no longer considered safe and reliable.

Father Thames has been a good servant for many years, but he is becoming overtaxed, and the supply of water to the first city in the world should be above suspicion.

It must either be largely supplemented, or a fresh supply obtained from a new and independent source.

Sewerage.—The principles upon which the sewerage of towns should be designed are now so well understood that it is not necessary for me to dwell thereon.

The chief points to be observed are a constant flow, so as to ensure self-cleansing, water-tight sewers, and adequate means for inspection.

The improvement in our water supply, and the more general supply of baths have materially assisted the first point, and we

now seldom see a modern pipe sewer designed by a competent engineer without the proper velocity.

There is also a marked improvement in the last few years in sewer construction, more attention being now made to the jointing.

Iron pipes, and patent joints to stoneware pipes are more generally used in water-logged and damp soils.

The infiltration of water does not do much harm, except by increasing the quantity to be dealt with at the outfall, but the porousity of the sewer is a source of danger in times of drought when the springs are low, as it then lets out the sewage into the surrounding subsoil.

The ordinary stoneware socket pipe jointed in cement, is, at its best, a poor form of sewer, but it is cheap, and by its means work is done which would not otherwise be attempted.

The patents for jointing pipes are fast running out, and the result may be a reduction in price.

The iron pipe has a great advantage over stoneware, as it is made in 9-feet and 12-feet lengths, consequently there are fewer joints. It can also be jointed to stand pressure, and with a head of water upon it is, in my judgment, the only reliable material.

These remarks as to sewers also apply strongly as to house drains, if we want a thoroughly water-tight drain, we should use iron pipes, the cost is not much more per house, and the result as regards efficiency cannot be too highly estimated.

I know I am in advance of the times, but I hope to see the day when iron pipes for house drains will come into general use.

The testing of sewers and drains, and the enforcement of regulations as to water-tight joints, have led up to better gradients and smaller sewers.

Local authorities do not now look upon a pump with fear and abhorrence, as they know within reasonable limits, what the annual cost will be.

They also know that the pollution of rivers and streams will not be tolerated, and that some form of sewage disposal must be adopted.

In order to do this effectually and economically, the flow at the outfall must be reduced as much as practicable.

These are all steps in the progress of sanitary science, one step leads to another, and, as we travel upward, the death rate goes down in corresponding ratio.

Sewage Disposal.—The sewage question, like the poor, is always with us. It has been solved by every sanguine inventor who has taken out a patent during the last thirty years; but it is not solved yet.

We are, however, settling down; medical officers, chemists, and engineers are now no longer in hostile camps—one party advocating the claims of land, another precipitation, and a third filtration, and so on.

The merits of each particular mode of treatment have become recognised, and experts are in most cases willing to admit there is a place for all, and that the particular mode of disposal must be governed by local circumstances.

There has been a great waste of money by Local Authorities and public companies in the treatment of sewage; they have been led away by patentees and others, who have persuaded them there is money to be made out of it. My experience has taught me that sewage is a thing to be got rid of at the least cost without nuisance.

Large quantities of crude sewage have been poured on to heavy clay lands, and the effluent from tanks, after chemical precipitation, has been discharged into small streams. Failure has resulted, and reconstruction has become necessary.

It is at this stage that Local Authorities are ready to accept any solution of the problem put before them which may get them out of their difficulties.

Bacterial filter-beds have now come to the front, and we are indebted to the State Board of Health at Massachusetts, to Mr. W. J. Dibdin, Dr. Sims Woodhead, Dr. Rideal, and others for their experiments, and the valuable information they have afforded us.

But do not let us set back the clock of time by expecting too much.

The principles laid down by the Local Government Board are sound, viz.:

Rainfall and Sewage to be calculated at three times the dry-weather flow.

Above three times and up to six times to be treated on storm-water filters.

Above six times the storm water may be discharged into a stream or on to prepared land.

The capacity of the filters to be taken at one-third for the fluid and two-thirds for the filtering material.

A cycle of eight hours for filling, emptying, and rest for aeration.

But when they ask that the filtered effluent, after double filtration through coarse and fine filters, should be pumped on to land suitable or unsuitable, then I part company with them. They are evidently waiting for the Report of the Royal Commission, and until that be received, they will stick to the old formula as to land.

This policy of the Local Government Board is stopping the use of these bacterial filters, as they refuse to grant a loan for their construction unless this land irrigation be adopted.

It is true local authorities can construct them out of rates, and I have received instructions to do so by the District Council of Berkhampstead.

Inexpensive Beds have been made at Sutton and at Harrow, by simply digging out the clay and burning it into ballast, but where there is no suitable clay and material has to be brought to the spot, and clay or concrete walls constructed, the cost is considerably increased.

Pure Air.—We examine our water supply, and we know by analysis, and by bacteriological observations, whether it is fit for consumption or not, but I am afraid we know very little of the air which we breathe.

If we could see impure air in the same way as we can see impure water, more attention would be paid by the engineer, and architect, and by the public generally, to the causes of its pollution.

It is not my province to trespass upon the duties of the Medical Officer by referring to the causes of preventable diseases, upon which I am not competent to offer an opinion, but I desire to call the attention of the engineer and architect to the works which he is called upon to design and to supervise.

He is responsible for the construction of sewers and drains, dwelling-houses, public buildings and workshops, and for their efficient ventilation.

Sanitary engineers are agreed that the drainage of water-closets, sinks, lavatories, and baths should be disconnected from the house, and ventilated; but there is a difference of opinion as to the merits of the "drain interceptor."

If it be abolished every house-drain will ventilate the sewer. Whether that is desirable or not I will leave to this section, in the hope that the question will be fully discussed by means of a paper on the subject.

The ventilation of sewers is one of those questions upon which a great deal has been said and written, but not much progress made.

In most towns there is some kind of ventilation, Bristol being the exception; the reason given for this latter being the rapid fall in the main sewers, causing a strong current of air therein.

It is, in my judgment, desirable that the air in sewers should be in connection with the external air by openings in all desirable points.

The air in the sewer is displaced by the increase in volume of

the sewage, and if openings be not made for its exit, it will find its way out at places where we least desire it.

When we consider that the cubical space in the sewer occupied by the sewage in the day, is double that during the night, and that this space is increased during rain, we see at once there is a movement of sewer air going on which should be provided for.

There is a great deal to be said in favour of open gratings in the centre of the streets, but they are liable to be closed by the near householder or the Local Authority, and therefore are not reliable.

I have come to the conclusion, that properly designed shafts should be provided, so that the air in the sewer may be changed as frequently as possible, some of these shafts will be inlets and some outlets, but in any case a diffusion of the sewer air will take place.

While saying this, I freely admit there is not that necessity for sewer ventilation now, that there was in the earlier days of sewer construction, sewers are now better designed, have better gradients, are laid more accurately, and are better flushed, consequently there is less deposit of fæcal matter, less decomposition, and less generation of noxious gases..

Healthy Dwellings.—One of the first considerations is the adoption of a dry sub-soil. In crowded towns this cannot always be obtained, vacant spaces are swallowed up by the "jerry builder," and as many houses as possible crowded upon a given area, but the Local Authority can make Bye-laws to minimise the evil.

They can stipulate that the entire area of the house shall be covered with concrete.

That the sub-soil be drained, and that the space under the floor be ventilated.

In most Bye-laws the Local Authority have adopted 150 feet super as the air space. But is this sufficient? It is the area adopted in this Borough, but it could be increased with advantage to the Public Health.

The height of rooms is fixed at eight feet as a minimum, but there should be some regulation as to the minimum area.

If the cubic capacity given in the Model Bye-laws, viz., 400 feet per adult, be adopted, then a room cannot be less than 100 feet area for two persons.

This is too small, as it only gives a room 10 ft. by 10 ft. The area should not be less than 110 feet.

In the Peabody Buildings, the bed-rooms are about 13 ft. by 9 ft., or 117 feet super, which is a far better area.

Under Section 91 of the Public Health Act, "Any house or

part of a house so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family," is held to be a nuisance.

But every Medical Officer knows this section is practically a dead letter. He cannot turn the poor people into the street, and he lives in hopes that his Authority will make some provision for those who cannot find suitable accommodation at a reasonable cost. But we move very slowly.

The Medical Officer makes a representation to the Local Authority; he condemns a certain area, and states that an improvement scheme is necessary. The Local Authority consider the representation, and after the display of a good deal of eloquence, so-called, and strong sympathy with the working classes, they sometimes make up their mind to do something. Plans and estimates are prepared and adopted, and the Local Government Board sit upon them; a local inquiry is then held, and in due course a Provisional Order is issued.

After a time the valuers of these dilapidated houses commence their work. Differences, of course, arise; the representatives of the Local Authority affirm they are only worth the price of the old materials, while the representatives of the owners of these insanitary dwellings allege that a very few pounds spent upon them would render them model dwellings.

Then the inevitable arbitration commences.

The Local Government Board appoint the Arbitrator, who is sometimes a barrister, and in due time the local authority acquire the property, and pay the costs.

They were under the impression they would be able to purchase the property under Section 21 of the Housing of the Working Classes Act, and that the estimate would be based upon the fair market value, due regard being had to the nature and then condition of the property, and the probable duration of the buildings in their existing state, and to the state of repair thereof; but they soon find out their mistake.

It is very easy to drive a coach and horses through an Act of Parliament, and the local authority realize that the costs, legal and otherwise are a considerable item, and that it is cheaper to settle, than to fight, even though they win their case.

The Corporation of Southampton are carrying out an improvement scheme and the Congress will be able to inspect the site, and the buildings now being erected.

The area is about 2¾ acres.

The claims of the owners amounted to £40,000.

The costs, including Solicitors' and Surveyors' charges was about £32,000, so that the cost of the land which the Corporation has acquired is about £11,600 per acre.

The effect of this is, the Municipal Lodging Houses and the Workmens' Dwellings will be a loss to the town, if we throw upon them the cost of the site.

I am afraid this cost will damp the ardour of the sanitary reformers, and it will be some time before the Corporation of Southampton will carry out a second improvement scheme.

If this were an isolated case it would not matter, but unfortunately the municipal authorities of other towns, who have been engaged upon this work, have had a similar experience.

The architect is thus handicapped at the start, as he cannot design workmen's dwellings which will repay the capital and pay the interest and working expenses plus this abnormal heavy ground rent. Then what is the remedy?

This question was most ably dealt with in a paper read by Mr. Percy Boulnois in the year 1893, in reference to the improvement scheme of the Corporation of Liverpool.

The cost of the buildings was £70,946, and the land £67,000, making a total of £137,946, from which was deducted surplus land £2,797, leaving a net cost of £135,149.

The annual cost of maintenance, rates, water, gas, &c., was £1,650 per annum. The income from rents £3,895, leaving a net surplus of £2,245 per annum, to meet the interest and sinking fund.

If we put this at £6,757 and deduct the £2,245, there is an annual loss to the Corporation of Liverpool of £4,512.

The Corporation considered this annual charge for clearing the site too much to be thrown upon the buildings, they accordingly fixed what they considered a fair ground rent, and charged the difference to the rates.

This is a way out of the difficulty; but it is only a transfer of account after all, and the fact remains, that the difference between income and expenditure must be borne by the ratepayers.

Will large towns incur this expenditure in the interest of the public health and for the benefit of the poorer classes? I do not think they will.

Then some other remedy must be found to reduce the overcrowding in large towns.

Some of those present have no doubt read those articles in the *Daily News*, entitled "No room to Live," in which it is shown that one in five of the inhabitants of London are living more than two in a room, with less than 400 cubic feet to each person, and one in ten live in one room.

The evils of overcrowding are admitted by all who have studied the question; it is the chief social problem of the age, but I do not think it will be solved by erecting large blocks of

buildings in the centres of industry, and crowding the poor together on the same area, only under better conditions.

These blocks in twenty years' time may become slums by overcrowding unless the present high standard of maintenance and supervision is continued.

One of the remedies I suggest for overcrowding is the erection of workmen's dwellings in the suburbs of our large towns, where the land can be obtained at a cheap rate.

The land in Simnel Street cost the Corporation of Southampton £11,600 per acre; it could be bought in the suburbs at one-fortieth of that cost.

The architect, under such conditions, would have fair play, and he would be able to design healthy dwellings, which would let at a rent sufficient to cover the expenditure, including interest and the payment of the sinking fund. The only condition necessary to render this scheme a success, is a tramway or light railway between the portion of the town where the workman earns his living and the suburbs where the houses referred to are built.

It will pay a Local Authority in a large town to carry workmen to and fro on a tramway worked by electric traction, at one penny per journey the whole distance.

The Corporation of Southampton carry workmen 2¾ miles in the early morning and in the evening by horse traction, for one penny, and when the electric traction is completed the traffic will be a source of income to the Municipality.

But, it will be said, this tram service, cheap as it is, costs the workman one shilling per week at the least. That is so, but the saving in rent is more than sufficient to pay the cost of travelling, and in addition he has a garden where he can grow a few vegetables, and—what is most important—he gets purer air, and a more healthy home for his wife and family.

The middle class, and even the clerk, seek a home where there is "more room to live"; and the crowds who flock into London in the morning by the suburban railways testify to the advantages of the system. Then why should the workmen not do the same? The only reasons I know are—

1st.—Proper provision is not made by railway companies and local authorities to carry him at a low charge.

2nd.—Many prefer, or are compelled, to live near their work.

Railway companies are forced by Parliament to provide for the workmen they displace when they seek powers to widen their lines or increase the areas of their stations; but why should they not be allowed to set apart land for the labouring classes in the suburbs, or build houses and include the railway

fare in the rent, such rent not to exceed that paid in the houses they pull down?

The provision of workmen's buildings near the area of displacement is systematically evaded by the railway companies. They buy up insanitary areas or vacant land already laid out for workmen's dwellings, and so satisfy Parliamentary Committees, but these dwellings would have been erected without their assistance, so that there is actually no provision made by them to remedy the evil they have created.

The housing of the poor is at the bottom of many of our labour troubles. When a workman pays one-fourth to one-third of his earnings in rent and rates, can we wonder at his action when he agitates for better pay?

The price of labour is continually going up, and the cost of building houses follows, rents are increased, and everyone suffers some indirect loss. May Parliament and local authorities take united action to eradicate this moral cancer which is paralysing our industries.

What we want in our large towns is expansion, and not concentration, in the interest of the public health, in the interest of temperance, and in the raising of the standard of morality and well-being of the people.

SECTION III.

PHYSICS, CHEMISTRY, AND BIOLOGY.

ADDRESS

By Prof. PERCY FRANKLAND, B.Sc., Ph.D., F.R.S.,
Professor of Chemistry in Mason University College,
Birmingham.

PRESIDENT OF THE SECTION.

WITH the same regularity as the return of the seasons, the Annual Congress of the Sanitary Institute has again come round, bringing with it the large attendance of those devoted to the aims of this influential and useful organisation.

The perennial success of these Congresses is in itself eloquent testimony to the living interest which sanitary matters claim in this country; and there can, indeed, be no doubt that "cleanliness and godliness" are being brought into closer and closer juxtaposition by an ever-increasing section of the community, and I think the Churches may not unreasonably fear that the traditionally smaller of these two virtues will perhaps ere long take precedence of the greater in public estimation.

It is necessary that we should distinguish between the place taken by sanitation and by sanitary science in the eyes of the public; for whilst we may congratulate ourselves that in matters of practical hygiene we are unquestionably the leaders amongst the peoples of the earth, in sanitary science proper we unfortunately occupy a much less prominent position. Thus I have myself been in small towns on the Continent which rejoiced in the possession of a University Professor of Public Health and a Hygienic Institute, putting to shame anything of the kind existing at the time in the whole of our own country, but in which the practical sanitation would have outraged the feelings of even the most ignorant of our Rural Authorities.

In this Section of the Congress we are more than in any other interested in sanitary science rather than in practical sanitation, and it is of the highest importance, therefore, that we should exert ourselves to place England on a better footing

as regards the instruction given, and especially as regards the prosecution of research in the science of hygiene.

To those who have seen the magnificent opportunities afforded for study and original investigation in sanitary science on the Continent it is a matter of humiliation to reflect how inadequately we are provided with similar institutions in this country, and how steadily we are losing our reputation as pioneers in this department of knowledge.

Sanitary science, like the other sciences, is languishing in this country, not for want of men of capacity, for these we undoubtedly have, but simply because science does not appeal either to the ruling classes or to the masses of this empire. We are languishing for want of money, of which pence are grudged for higher education and research, where pounds in thousands are readily conceded for ironclads, torpedo-boats, and other warlike material. Far is it from my intention to deprecate the expenditure of money on what are still—and what will, in my humble opinion, long remain—the obvious necessaries of imperial dominion; but if the same liberality be not extended to the promotion of higher knowledge and discovery one of our chief prerogatives and titles to such dominion will disappear.

Those who hold the purse-strings of this country have got to learn—and that without any further delay—that the progress of science is, even for political and commercial reasons, of as much importance as the perfection of our imperial defences, and that such progress forms, indeed, a national bulwark of equal strength, although invisible to the vulgar eye. It must be further recognised that the prosecution of scientific research is becoming annually more costly, and entails the provision of specially favourable conditions; that, in short, it depends no longer upon the man alone, but also upon his opportunities and general environment.

These are matters which, curiously enough, appear self-evident in other countries, but cannot be sufficiently reiterated in our own.

As the scope of our section practically includes the whole of sanitary science, or the ultimate principles on which the entire practice of hygiene is based, it is obvious that our horizon is a very wide one, and that it is only possible in an address, such as that which I have the honour and privilege of delivering to you to-day, to touch upon a few of those matters in this vast field with which I happen to have come more particularly in contact myself.

One of the great engines in this country for the advance of general knowledge and of public opinion on many matters, is unquestionably the Blue-book of a Royal Commission or of a

Departmental Committee. The average Englishman believes in the contents of such volumes bound in blue paper with the same unquestioning and childlike faith as he accepts the verdict of a jury of twelve men, as to whose names, attainments, character, and position he is as ignorant as he is indifferent. To doubt the inspiration of a Blue-book, and to go behind the finding of a jury are to him two forms of heresy which strike at the foundations of British society, and merit, therefore, the severest condemnation, if not the most drastic punishment.

There can be no doubt that both are on the whole excellent institutions, and it is far from my purpose even to attempt to drag these idols from their pedestals, for in matters affecting hygiene and public health, the Blue-book has almost invariably been a beneficent agency, and it is only to be regretted that the actual powers of the commissioners and committeemen who compile the contents are limited to commanding outward respect, whilst their recommendations generally receive the same treatment as that which we are all in the habit of according to so much excellent advice which is daily offered to us by our neighbours.

In matters connected with hygiene and public health, the past year has been remarkably fertile in this inspired and blue-bound literature, for no fewer than three reports of three separate Committees have been issued, and the contents of each cannot fail to be of interest to the members of this Congress.

The matters dealt with in all three cases are in one respect of a similar character, for in each the Committee was requested to investigate an alleged conflict between certain industrial interests and the interests of hygiene.

In one we have a conflict between the interests of the gas manufacturer and the safety of the general public, in another a conflict between the interests of pottery manufacturers and the health of their employés, whilst in the third, again, it is an antagonism between the interests of the manufacturer of lucifer matches and the health of the work-people which forms the subject of enquiry.

The first of these enquiries is obviously the one which is of widest interest, affecting as it does practically the whole of the general public. This enquiry has been provoked by the recent introduction of modifications in the process of gas manufacture, leading to the circulation in many of our towns of an illuminating gas, appreciably richer in carbonic oxide, which, as is well known, is the most poisonous constituent of ordinary coal-gas. The enquiry is, in some respects, a very remarkable one, for it is admitted on all hands that the actual risk to the individual by this increased proportion of carbonic oxide is almost infinite-

simal, and it might therefore at first sight be thought hardly worth while to make this a subject of elaborate investigation. I believe, however, I am right in thinking that there is something fundamentally repugnant to an Englishman in the idea that even a single life should be unnecessarily sacrificed; it is an injustice to the individual, and injustice to a single unit is as opposed to our instincts and traditions of fair-play and equity as that which effects a whole community or even an entire race. Indeed, in some respects such individual injustice appears even more intolerable to British sentiment than an injustice affecting many.

The danger involved by the admixture of water-gas with ordinary coal-gas was investigated by a particularly competent committee, which actually numbered amongst its members one scientific man, Dr. Haldane, F.R.S., who had already previously devoted his attention with success to the subject.

A large amount of interesting information was collected by the committee, which is to be congratulated on having taken up a strong position in respect to this growing danger to the community entailed by the admixture beyond certain limits of water-gas to the ordinary household illuminant.

It has been conclusively shown by Dr. Haldane that, given equal conditions as to size of room, ventilation, flow of gas, and length of time to which a person is exposed to an escape of gas, the danger to life from such an escape is far greater in the case of gas containing any considerable proportion of water-gas than in the case of ordinary coal-gas. In fact, the really important point to bear in mind is that the danger increases at a much greater rate than the proportion of carbonic oxide; or, in other words, that a gas containing twice as much carbonic oxide as ordinary coal-gas is much more than twice as dangerous as the ordinary coal-gas itself.

In the opinion of the committee, convincing evidence of the danger attending the distribution of gas rich in carbonic oxide is to be found in the mortality statistics of Massachusetts. These figures show that in Boston—

1886	no water-gas	29,554	gas consumers	0 casualties.
1890	8 %	,,	46,848	,,	6 deaths.
1895	90 %	,,	68,214	,,	24 ,,
1897	93 %	,,	79,893	,,	45 ,,

These figures show that the unrestricted development of the water-gas industry must be viewed with grave apprehension. Fortunately there is not the same commercial advantage in this country for the substitution of water-gas for coal-gas to the extent which this has already taken place in America, and it should, therefore, be the more easy to control the proportion in

which it is distributed. The committee suggest that the distribution of gas containing more than 20 per cent. of carbonic oxide should be prohibited, a limit which would roughly correspond to a mixture consisting of equal parts of coal-gas and carburetted water-gas.

The question of the practical danger attending the distribution of water-gas is not a little complicated by the fact that a considerable number of the fatalities to which I have referred as having taken place in Boston were due to suicide—not to accident. Thus, whilst this circumstance shows that the danger from accident is less than would be indicated by the total number of deaths, it demonstrates, on the other hand, that a particularly seductive instrument of death is being distributed broadcast amongst the population.

The legislature of civilised countries interferes in the matter of the distribution of deadly poisons, solid and liquid; but perhaps it is too much, even at the close of the nineteenth century, to expect our rulers to possess sufficient scientific education to take cognisance of an invisible gas.

The other two Blue-books of sanitary interest, which deal with the dangers of the pottery and match industries respectively, may be perused with the same fascination as a number of the *Wide World* or the *Strand Magazine;* indeed, they might be advertised as readable from cover to cover. This is, however, not surprising when it is borne in mind that the contents of both are largely the work of Dr. Thorpe, whose high scientific attainments are so well known to be combined with an unusual degree of literary skill.

The inquiry into the employment of compounds of lead in the manufacture of pottery has revealed the fact that a very large number of operatives in this industry are victims to that subtle form of disease known as plumbism or lead-poisoning. Thus it appears that in the North Staffordshire district alone there were, in July 1898, 3,123 males and 1,580 females employed in processes where lead is used in the manufacture of earthenware and china; and that during the three years from 1895, when the Compulsory Notification Act came into force, there were no less than 1,085 cases of plumbism actually reported, 478 of these having occurred amongst men, and 607 amongst women; or, of the workers engaged in 1898 alone, 4·9 per cent. of the men and 12·4 per cent. of the women became so palpably affected with lead-poisoning during the year that they were actually reported to the inspector. These figures speak for themselves, and show that we are here face to face with an evil which the policy of *laissez-faire* and the principle of free contract can no longer be allowed to foster and promote.

Dr. Thorpe and his colleagues are not content, however, merely to point out the existence of this evil and its magnitude, but they have given the most careful attention to the possibility of mitigating, and, if possible, of wholly abolishing it. In doing so they have very fully considered the claims of industry; and their conclusions, which are most clearly and emphatically formulated, must be welcome reading to all who are interested in the welfare both of the workers and of the industries which have created them. Thus Dr. Thorpe and his colleague "have no doubt whatever that leadless glazes, of sufficient brilliancy, covering power, and durability, and adapted to all kinds of table, domestic, and sanitary ware, are now within the reach of the manufacturer. There are, however, certain branches of the pottery industry in which it would be more difficult to dispense with the use of lead compounds. But there is no reason why, in these cases, the lead so employed should not be in the form of a fritted double silicate. There can be little doubt that if lead must be used, the employment of such a compound silicate would greatly diminish the evil of lead-poisoning."

Further, Dr. Thorpe and his colleagues have had the courage to touch upon a question of enormous importance and extreme difficulty, viz., the propriety of prohibiting female labour in those parts of the pottery industry in which contact with lead is unavoidable. There appears to be no doubt that women are more susceptible to lead-poisoning than men, and that plumbism is attended with particularly disastrous consequences in the matter of producing healthy offspring. This is indeed so well recognised that at certain pottery works in Belgium there is a rule which is rigidly enforced, that the women engaged at these works lose their employment on entering into the matrimonial contract. All interference with the so-called rights of women is of course especially difficult in an age in which a powerful agitation is going on to place women on exactly the same footing as men in every particular. Now, whatever may be our views, sympathetic or otherwise, with regard to many aspects of what should, I suppose, be called the "Woman's Movement," we, as members of this Congress, which is devoted to the promotion of the public health, must be agreed that any rights, either of men or women, which are opposed to the welfare of future generations must be sacrificed without either hesitation or remorse. I take it that we are all at one in firmly believing that our most solemn duty is to see that our offspring shall, as far as lies in our power, be placed under more favourable surroundings, and have a better chance of healthy development than we ourselves have individually enjoyed. But the health and welfare of posterity is so intimately

connected with the conditions under which women and especially mothers live and carry on the most important industry of all—the production of men—that I venture to say that future generations will laugh to scorn our much vaunted civilisation of the Victorian Era, in which the State, whilst concerning itself with what will be regarded as all sorts of comparatively trumpery hygienic reforms, has almost entirely neglected the all important one of guaranteeing that each person entering this world shall do so under conditions which shall be a legacy, not only to the individual, but to humanity throughout all ages.

In recommending State interference with female labour, this Blue-book on the Pottery Industry will serve to show future generations that in the 19th century there were, at any rate, some who recognised, however dimly, the direction in which the most important of all hygienic reforms would some day be carried out.

This Blue-book has already produced some practical result, and it was with particular satisfaction that I read only a few days ago an advertisement for a large consignment of earthenware goods, in which the absence of a lead glaze was expressly stipulated.

Let us now turn to the third Blue-book of the year, which deals with the use of phosphorus in the match industry.

Here again we have evidence of mischief, much more terrible in its nature than that of lead-poisoning, done to human beings through an industrial occupation. As is well known, the unhealthiness of the match industry depends upon many of the workers being exposed to phosphorus fumes, which exposure may give rise to necrosis of the jaw, a most painful and loathsome malady, which, even when it does not end fatally, leaves the sufferer more or less permanently disfigured.

It has been found very difficult to obtain reliable statistics as to the danger attending the match manufacture, as it is notorious that many cases have been suppressed, a leading firm having but quite recently been convicted of this cowardly and criminal proceeding. As far as the statistics go, however, it appears that in the United Kingdom there were in 1897–8, 1,521 persons engaged in processes involving phosphorus exposure, whilst, during the five years, 1894–8, thirty-six cases of necrosis have become known. Dr. Thorpe and his colleagues, however, emphasize the fact that prior to the last year or two, the records cannot be regarded as at all complete, and the above number of cases of necrosis is, therefore, doubtless very much below the truth. But when the horrible nature of the malady is taken into consideration, even the mischief indicated

by the recorded figures represents a heavy responsibility, which weighs upon the match manufacturer and the match consumer alike.

As in the case of the pottery industry, so again here; chemical science has not been found wanting in ability to devise means of obviating the mischief, for the discovery of so-called amorphous phosphorus already in 1845, placed at the disposal of the match manufacturer a material which is entirely free from the dangers which surround the handling of the ordinary form of phosphorus. This amorphous phosphorus is, moreover, available for the manufacture of safety matches, which were invented in the same year, and were first made in this country in 1855. Even at the close of the century, however, the production of safety matches is quite an unimportant industry in this country compared with that of the "strike everywhere" match. The public can no longer plead ignorance as an excuse for demanding an article which annually causes terrible suffering and disease to a section of the producers, for the matter has on a number of occasions been well ventilated in the daily press; so that the newspaper-reading Englishman, and as far as my experience goes, the average Englishman reads little or nothing else, is well aware of the hideous selfishness of which he is guilty in purchasing any other form of match than the "safety." In this matter, as in many others, Switzerland leads amongst the nations, for within the territory of that little republic, the use of any matches excepting "safeties" is absolutely prohibited.

It is earnestly to be hoped that the admirable reports of Dr. Thorpe and his colleagues, on the mischief incidental to the manufacture of the common match, will lead the public to direct their serious attention to the removal of this scar on our civilisation. Meanwhile it is the obvious duty of every individual making any pretensions to the possession of a conscience, to forthwith banish for ever the common match, both from his house and his pockets. I would in this matter address my appeal especially to the fraternity of smokers, who are by far the largest consumers of matches, and I fear also the worst offenders.

The publications on water-gas, on pottery, and on matches, to which I have referred, show that chemical science has recently been most successfully enlisted in the service of hygiene, and, if only our legislators and the general public will act upon the carefully-considered recommendations which have been formulated by the eminent men of science to whom these investigations were entrusted, there can be no doubt that

another step will have been made in our victorious advance into the territories of disease, suffering, and death.

This section of the Congress is, however, also concerned with the applications of biology to sanitary science, and, with your permission, I will now proceed to say something of this side of the subject. Here, again, it is necessary that I should limit my observations to the discussion of a very few points with which I have been more especially brought in contact myself.

The department of biology which has for a number of years now been most prominent in its connection with public health is, of course, bacteriology; although recently biological investigations altogether unconnected with bacteria, such as the wonderful researches of Calmette and others on snake poison, have shown that there are other directions in which biological science can be of signal service in diminishing the dangers with which life is surrounded.

The science of bacteriology is now so firmly established in public estimation, and its utility to man is so fully recognised, that it is no longer necessary to introduce it with an apology, nor does its mention now evoke the smile of contempt which some of us can well remember on the faces of our audiences, when both the science and we ourselves were but some ten or fifteen years younger than we are to-day. Time and ceaseless toil beget lines and wrinkles, which impart dignity and command respect; and this has been the case with bacteriology. Its reputation is assured, although much of the elasticity and hope of its youth have gone. Some of the expectations which were entertained of this new science have proved illusory. Take, for instance, the application of bacteriology to the hygienic aspects of water supply. How many enthusiasts for the new science thought that a revolution in our methods of dealing with the problems which present themselves in connection with water supply was at hand, and that the guarded opinion of the chemist recommending or condemning the use of water, on review of all the circumstances connected with it, would be substituted by the authoritative pronouncements of a bacteriologist, who would be able to declare, "This water is absolutely safe, because it is free from all pathogenic bacteria," "This water will cause cholera," and "This one typhoid," &c. Far from the introduction of bacteriological methods having proved the dawn of such a new era as was anticipated by the sanguine and misguided enthusiasts in question, time and the more careful study of micro-organisms have shown the insuperable difficulties in the way of arriving at any such clean-cut and definite conclusions. Indeed, the detection of specific pathogenic bacteria in drinking water is now known to be almost

beyond the range of practical politics, and the search for such bacteria is, in general, only carried on in deference to the special request of the layman, the uninitiated, or the hopelessly ignorant, whilst it cannot be repeated often enough that any feeling of security which may be gathered from an unsuccessful search for pathogenic bacteria is wholly illusory, and in the highest degree dangerous. Notwithstanding these misconceptions, which still linger long in places, the real and great value of bacteriology to water hygiene is now very generally recognised.

By far the most important service which has been rendered by bacteriology in this connection is the means which it affords of controlling the efficiency of filtration and other purification processes. Such bacteriological control is now systematically and regularly exercised at a number of our more important waterworks where filtration is carried on, and the result is a highly beneficial one, as the slightest irregularity or defect in the process of filtration is at once laid bare, and brought to the notice of the engineer in charge. The water engineer has now a standard of efficiency to aim at, and receives a stimulus and encouragement in his work, the former absence of which must have been in the highest degree disheartening.

The bacterial purity of well-waters can also be satisfactorily controlled, any departure from their normal character being at once detected, whilst again the great bacterial improvement which surface waters undergo by storage and sedimentation has been ascertained, and has led to the further extension of this important means of purification.

Again, the water expert is now being guided in the formation of his opinion by the qualitative nature of the bacteria which he discovers; the presence of indol-producing bacteria, and bacteria which grow in broth and jelly containing a certain proportion of phenol, affording indications of considerable value to the skilled and experienced observer.

In short, the bacteriological methods which some of us welcomed fifteen years ago as invaluable adjuncts to the chemical methods of water examination, have brought forth abundant fruit, and have been of the greatest assistance in that work of making provision against water-borne disease, which was first inaugurated on scientific lines by those classical labours which are recorded in the Sixth Report of the Rivers Commission in 1874, and form a landmark in the hygienic annals of the present century.

From the bacteriology of water we have in the last few years passed to the bacteriology of sewage, and hardly a day goes by without opinions being publicly expressed with regard to the

bacterial purification of sewage. From the terms in which the majority of persons discuss this subject, it might be supposed that the bacterial purification of sewage was a discovery possessing the same kind of novelty as the Röntgen rays or wireless telegraphy, whilst as a matter of fact, of course, practically the only purification of sewage which has ever taken place in the past, or ever does take place at present, is entirely due to bacterial action; in short, we have been all along bacterially purifying sewage, like M. Jourdain spoke prose, without knowing it.

Again here, as in the case of water hygiene, it is to the work of the Rivers Pollution Commissioners of thirty years ago that we must turn, not only for the first indications of how sewage purification should be carried out on scientific lines, but for the most complete instructions as to how the real purification of sewage must be conducted.

The classical investigations of the Rivers Pollution Commissioners showed already a generation ago that the purification of sewage by chemical means alone is an *ignis fatuus* and a chimera, but that by distributing sewage over porous materials, which are alternately bathed with the sewage and atmospheric air, a degree of purification is obtainable which a generation of eager investigators has been unable to improve upon.

The extraordinary possibilities of purification attained by land irrigation and intermittent filtration were fully established before the advent of bacteriology, and this new science has not given us any new method of sewage purification at all, but has only furnished the explanation of the marvellous achievements described in the Reports of the Rivers Pollution Commissioners.

If then the purification of sewage through the agency of porous surfaces had been fully established before the work of Pasteur, Schloesing, Müntz, Winogradsky, and many others had revealed the essential factor in these porous materials to be the legions of bacteria with which these materials are swarming, what is the novelty attaching to that which at the present moment is commonly understood by the bacterial treatment of sewage?

The important departure which has been recently made and with which we especially associate the name of Mr. Dibdin, is not the discovery of a new principle of sewage purification, but the adaptation of an old and well established one.

The merit of this important new departure lies in its providing for the display of the activities and powers of these countless legions of bacteria a more suitable field than that which is afforded by the natural soil in which they had formerly been constrained to carry on their operations.

As so distinctly pointed out by the Rivers Pollution Commissioners, it is not only necessary to have soil of a suitable character for the efficient purification of sewage, but this soil must be supplied with a sufficient quantity of air. Now, the adequate aëration of ordinary soil is always more or less a matter of accident, is difficult to regulate, and requires a very considerable amount of time, owing to the close texture of the material. These difficulties have provoked the attempt to obtain the bacteriological purification of sewage more expeditiously and under more perfect control by substituting artificial beds of porous material for the soil—always more or less haphazard in character—which Nature provides. The advantages gained by the use of such artificial beds in place of the application of sewage to land are almost comparable to those which are realised by the substitution of steam for wind and water power. The gain is in compactness and manageability of the machinery involved, and not in the amount of energy required to produce a given result.

The degree of purification, again, can be more perfectly regulated than in the case of land treatment, for if the purification achieved in a single bed is not sufficient the effluent can be brought in contact with a second, and even a third or a fourth; and, again, the number of such contacts and the length of time during which the beds are allowed to remain idle for aëration can be varied according to the variable nature of the sewage which has to be dealt with in different places, or even at the same place during the twenty-four hours and at different periods of the year. In short, we have in these bacteria beds a very beautiful piece of biological machinery, which, however, like all delicate appliances, requires careful management, and is subservient to the law of the conservation of energy. It cannot perform the impossible, and all attempts to exaggerate its powers will only check progress and bring it into disrepute.

It does not either follow that such artificial beds for inducing the bacteriological purification of sewage are the best adapted for use under all circumstances. The more delicate the machinery, the more careful is the management required for its successful operation—and such management, of course, involves expense. Thus, whilst in the case of large towns the provision of an adequate area for efficient land-treatment is often an insuperable difficulty, and the additional cost involved in managing bacteria beds a minor consideration, there are many smaller places where land in plenty and of suitable character can be inexpensively obtained, and where consequently the construction of artificial beds, with their more costly management, would be a move in the wrong direction.

The bacteriological purification of all refuse organic matter has, since the classical researches of Pasteur on the functions of bacteria, been known to take place in two phases, of which the first consists in the breaking down of complex organic compounds by bacteria, which flourish in the absence of air, and were named by Pasteur *anaërobic organisms;* whilst in the second phase the process of purification is completed by the agency of bacteria requiring the presence of air for the exercise of their functions, to which, therefore, the name of *aërobic organisms* has been given.

In the ordinary course of nature, both of these phases of purification are taking place side by side, and are governed by purely accidental circumstances. Thus, if we consider the case of a small particle of solid refuse organic matter, we should find that in the interior of such a particle anaërobic processes were at work, whilst on the surface aërobic bacteria would be exercising their purifying functions. The question naturally arises as to whether it is desirable that these two processes should thus be going on in close juxtaposition, or whether it is not more advantageous to provide the conditions most favourable for the first class of bacteria in one place, and the conditions most favourable for the work of the second class of bacteria in another.

It is obvious that the indiscriminate mingling of different classes of operatives in one place is entirely opposed to the principles of organisation which are universally adopted in all industrial establishments. If we go into any well-conducted manufactory, we shall find each class of the employés carrying on their particular work in a separate room, or even in a separate building altogether, and only in an ill-regulated establishment do we see the different classes of workmen jostling each other, and interfering with each other's duties.

In the purification of sewage, similarly, the necessity is more and more forcing itself upon experts of adopting the usual industrial plan of separating as far as possible the different classes of the myriads of microscopic hands which a sewage works has in its employ, and of providing for each a separate and suitable place in which they can carry on their particular line of business without interference.

The recent experimental work on the bacterial treatment of sewage, which has been conducted with a thoroughness and an attention to detail quite unprecedented in the history of sewage purification, shows most conclusively that the best results are achieved by separating the phases in which the bacterial purification takes place, allotting distinct premises t

the anaërobic and the aërobic organisms respectively engaged on the works.

We are all aware of the difficulties attending the management of human labour, these difficulties being one of the great social problems of the day, but no less harassing difficulties are encountered in the management of the microscopic artizans of the sewage works. The anaërobic bacteria are supplied along with the sewage, and practically no difficulty arises in retaining their services on the works, beyond that of providing them with space and time in which to carry on their labours; the aërobic bacteria, however, demand air in addition to space and time, and if this air be not provided in sufficient quantity, they go on strike and leave the works, their place being taken by their less exacting anaërobic brothers who are, however, unable to finish the work of purification. There is thus the constant tendency for the overflow of the anaërobic bacteria into the aërobic department of the works, if there be any stinting of the air in the latter. In order, therefore, to insure the services of the aërobic bacteria being retained on the premises, it is desirable to provide for the aërobic bacteria at least two workshops through which the sewage, on coming from the anaërobic department, is made to pass. The first of these aërobic workshops it may be difficult to always provide with adequate ventilation, the result being that both anaërobic and aërobic bacteria will here be found competing with each other, and that the aërobic bacteria will be unable to finish the work of purification. The sewage, however, on passing into the second and better ventilated workshop, will there fall almost exclusively into the hands of the aërobic bacteria, which it will under proper management, leave as an inodorous, almost pellucid liquid incapable of putrefaction.

This is, in outline, the method of septic treatment, followed by double or even multiple contact on bacteria beds, which would appear to constitute the most rational principle on which to organise those bacterial legions which nature so lavishly provides for the destruction of refuse organic matters.

The modern sewage works must, however, not only be prepared to deal with the ordinary or normal contents of the sewers, but those extraordinary volumes of liquid which make their appearance after sudden showers and heavy rain, and commonly go by the name of *Storm Water*, must be provided for and subjected to some purification before discharge into the nearest water-course.

Artificial beds obviously offer particular facilities for dealing with these enormous volumes of liquid, which from time to time come down to the works and demand the immediate attention

of the manager at any hour of the day or night. For the artificial beds being under perfect control, the quantity of liquid which can be passed through them in a given time admits of regulation with the greatest nicety. At first sight it might be supposed that this storm water, being the ordinary sewage plus a large volume of rain water, would be a very weak sewage, and that it could, therefore, be sufficiently purified by passing it at a comparatively high velocity through the bacteria beds. Experience, however, shows that for some time after the commencement of a storm, the increased volume of sewage is by no means exceptionally weak, but, that on the contrary, it brings down with it a large amount of highly polluting solid matter, the washings of the streets and sewers, which is calculated to have a most prejudical effect on the beds. It is, in fact, only after the rain has been falling for some time, the length of which depends upon local conditions, that the storm water becomes dilute, and that it can safely be subjected to an accelerated process of purification.

These circumstances point unmistakably to the necessity of very carefully purifying the first instalment of storm water, instead of hurrying it at once into the nearest stream, as is the general practice at present. The exact manner in which this first instalment of storm water should be dealt with must be regulated by local considerations, but a reasonable plan of action would consist in providing a sufficient spare tank capacity to impound the necessary volume of highly polluted storm water, to then deal with the weak storm water on the bacteria beds by accelerated treatment, and finally, when the storm is over, to purify the impounded first instalment at leisure, by gradually adding it to the normal sewage flow.

I have, however, already trespassed long enough on your patience in the matter of this subject of sewage purification, but I would plead its ever-increasing importance and urgency in justification of my having done so. From what I have said, however, it will be evident that sewage purification must now be regarded as a fermentation industry, ranking with brewing, distilling, and vinegar manufacture in the nature and complexity of the scientific principles involved, and the skilled attention and control which its successful exercise entails. But whilst the industry of sewage purification ranks in respect of its scientific foundations with the other fermentation industries, it differs entirely from them in one detail, and that unfortunately under the present conditions of society the most important of all. We know that breweries and distilleries are amongst the most remunerative concerns in which investment for capital can be found on the Stock Exchange, but for

the present, at any rate, science is not in a position to extend even the hope that the industry of sewage purification can be carried on at any profit at all. Who shall, however, venture to predict what science, with her limitless possibilities and resources, may not conjure from the lap of the future?

In conclusion I would again repeat—for in this country it cannot be sufficiently reiterated—that it is by the devoted prosecution of those pure sciences with which in this Section we are especially concerned that the health, the wealth, and the happiness of man are advanced and promoted. A single scientific discovery—which to-day may appear of so little importance that it entirely escapes public notice—may within a few years effect a revolutionary transformation in the habits, in the comforts, and in the fortunes of mankind. The present century alone bristles with examples of the most wonderful and unexpected blessings showered upon the world by the application to practical life of discoveries made in the secret interrogation of Nature by the man of science, whose sole object was to raise one small and apparently insignificant corner of that thick and heavy veil which shrouds the unknown.

CONFERENCE OF MUNICIPAL REPRESENTATIVES.

ADDRESS

By Alderman T. Walton, J.P., Chairman of the Health Committee of the Southampton Corporation.

PRESIDENT OF THE CONFERENCE.

Allow me to supplement the welcome accorded to you by the Mayor in paying a visit to this ancient Borough.

The Town and County of Southampton has for centuries past played no unimportant part in the history of our country. Celebrated during the Middle Ages—from its proximity to the Continent—in being the port of embarkation for some of the great military achievements of those days, being only twelve miles distant from England's ancient capital, Winchester, it was in Norman times the port of that capital in the intercourse with Normandy, and became one of the chief ports for Continental trade, a trade it may be justly said, which at the present day is an ever increasing quantity. The geographical position, it occupies, with its splendid estuary, its double tides, and the beauty of the New Forest on its banks, make it a most enjoyable resort for meetings of this character, where business and pleasure are combined.

Population.

The Census of 1891 showed the population of the Borough, in April of that year, to be 65,325. In the year 1895 the area of the Borough was extended to include a large suburban population on the Western side, the increase being from 2,024 acres to 5,295 acres, the number of inhabitants at the end of the year 1895 being estimated at 94,093 persons. During the past three years the population has increased by leaps and bounds, the number estimated at the end of 1898 being 103,168. As evidence of the growth and importance of the town it may be mentioned that the Works Committee have upwards of 900 building applications to consider every year. A new code of Building Bye-laws, which were urgently needed, has been drafted, and now awaits the approval of the Local Government Board.

From a sanitary point of view Southampton has not been idle. Much has been effected, but much more remains to be

done. Modern ideas require improvements to be carried out, and a benevolent Legislature is always on the alert by passing enactments and creating Departments to protect the lives and health of the people. And although, perhaps, here we are rather late in introducing an improved sanitary condition, it must not be forgotten that public opinion has to be educated, and that reforms, although urgently needed, have to be proceeded with, with deliberation; the "long suffering" ratepayer has to be taken into account, and it is difficult to convince him that the altered conditions of life require a different treatment to that accorded years ago, and that sanitary measures will in the end conduce to improved health, improved morals, and materially increase the wealth of the locality; he still thinks of the large amount he is being called upon to pay now, compares it with former years, and unfortunately never thinks of those periodical outbreaks of disease that occurred, which, from the fact that no efforts had been made to prepare for them, not only were disastrous in their effect upon the unfortunate victims, but also did immense damage to the trade and reputation of the town.

I propose now to give a brief summary of the most important Sanitary Works already completed, and of others in course of being carried out at the present time.

Water Supply.

We can boast of most ample supply of the purest water, obtained from the chalk at Otterbourne, about nine miles from the town. The works have now been in operation for about eleven years, and have been carried out under the direct supervision of our Water Engineer. As you will have an opportunity of visiting these works, I need not enter here on a description of them, I need only say that not only is the water excellent in quality, but the supply is practically unlimited, and the cost of the works will bear favourable comparison with others of similar character throughout the country. It is much to be regretted that the whole of the borough is not supplied with the Corporation water. The portion of the borough added to the old borough some four years ago is still supplied by a company, and Parliament in its wisdom has not yet acceded to our wishes to purchase and obtain the control thereof.

Sewerage.

The system of sewerage adopted and carried out for many years was, I suppose, similar to that adopted in other seaport towns, the expanse of water being a ready and convenient receptacle for emptying the sewers into; such at any rate was

the system in operation here. But during the past few years a more enlightened policy has been pursued. A new scheme was adopted by the Council at a cost of about £100,000, and is now being rapidly carried out. No sewage matter will be allowed to flow on to the western shore, the whole quantity from the northern, western, and central parts of the town being taken to a convenient site on the banks of the Itchen, where it will be chemically treated, the sludge being pressed into cakes and the effluent, deprived of its noxious constituents, turned into the river. It is expected and devoutly hoped that this will effectively prevent the recurrence of the nuisance complained of on our western shore, which has been a black spot on our otherwise fair fame. The works, as also a smaller one for dealing with the Portswood sewage, are being carried out under the supervision of our Borough Engineer.

Refuse Destructor.

On the same site a refuse destructor was erected several years ago, and has recently been enlarged. The whole of the ashes and other dust-bin refuse is regularly collected by our own labour, and taken to the destructor and burned. The Corporation has its own stud, which is employed in this and other town work, and consists of about seventy horses.

The water supply, the drainage works, and the destructor are in the hands of the Works Committee. As to the Health Committee, with which I have been associated for the past ten years, of which also I have been chairman seven years, the principal matters to which I would desire to draw your attention are those in which we have been engaged since the appointment of our present Medical Officer of Health, Dr. A. Wellesley Harris, in 1890. Much has been done from a sanitary point of view since that date, no doubt accelerated by the passing of such legislative enactments as the Infectious Disease Notification Act, Public Health Amendment Act, Infectious Disease Prevention Act, Housing of Working Classes Act, and several others. It would not be possible for me to dilate on all that we have attempted since that date. I will therefore briefly state the principal.

Isolation Hospital.

In 1890 the accommodation we had for this purpose was of a most primitive character. An old private house was purchased about the year 1870; a lady housekeeper was placed in charge, and an allowance of so much per head was made her when there were any patients. Well, we had to wake up. The adoption of the Notification of Infectious Diseases Act, the

fear that cholera might be brought into port, the introduction of small-pox from the West Indies, did make us wake up in the year 1892. The hurrying we had, the wholesale expenditure of money in order to make temporary accommodation, had the effect of bringing it home forcibly to the Council that temporary makeshifts were false economy; and that it was absolutely necessary, in order to efficiently and economically cope with infectious diseases, to have a permanent institution equipped and prepared for any emergency that might arise. We were aided in this decision by the fact that Southampton is most peculiarly situated; vessels are constantly coming into the port from all parts of the world, and it is impossible to say what a day may bring forth.

In 1893 we bought a vessel which has been constructed into a floating hospital. It has been most useful, not only for port purposes but also for the reception of cases occurring in the town; while to be prepared for other sea-borne cases another vessel has been temporarily engaged. In order to deal promptly and systematically with infectious diseases in the town we are now building an isolation hospital, about three miles from here. We believe it will be as good a type of hospital as there is in the country; the site is an excellent one, about 10 acres, the pavilions will accommodate 100 beds, and the total cost we estimate at about £35,000. We are experiencing at the present time the great need of such an institution. When isolation was first practised here there was the utmost objection to it; people refused to have any portion of their family removed without great persuasion on the part of the Medical Officer of Health, and occasionally it seemed all but impossible for him to carry out his duties without having resource to legal process. Now, however, a totally different spirit prevails. It is well known that the greatest solicitude is shown towards the sufferers; that the treatment—medical and otherwise—is of the best description; that the parents are able to pursue their daily avocations without let or hindrance. And so we find that when a case occurs now there is the greatest anxiety that the stricken one should have the benefit of this humane and sympathetic treatment.

I hope the delegates to this Conference will view the hospital, which we hope to open towards the end of the year.

Housing of the Working Classes.

In the year 1891 the attention of the Council was called to the conditions under which many of the lower classes of the inhabitants were housed. A very elaborate and exhaustive report, dealing with between 600 and 700 houses, was presented

to the Council by Dr. Harris, the Medical Officer of Health. This report showed that 2,599 persons were housed in most insanitary dwellings, without proper light, air, or ventilation; and in many of the areas reported upon, nothing but a re-arrangement of the buildings would remedy the evils.

In some of the areas reported upon there were 441 persons to the acre, compared with 32·4 for the whole Borough—605 were children under 10 years of age—and had it not been for the fact that during a large portion of the time the inhabitants lived an outdoor life, the result of overcrowding and living in a confined atmosphere must have been disastrous. The Council chose an area of between two and three acres of the worst part —most of the buildings being very old, the neighbourhood being most picturesque, teeming with historical associations, but from a sanitary point of view hotbeds of disease. The scheme proposed was confirmed by Parliament, and the work proceeded by first demolishing the existing buildings, laying out the site, and erecting on the first section a Municipal Lodging House, containing about 200 beds, which is now nearly completed, and also a block of Artizans' Dwellings which are now in progress. By order of the Local Government Board the area was divided into three sections. No. 1 is now being dealt with, and when the buildings are completed Nos. 2 and 3 will be proceeded with. I do not desire to speak in any carping spirit as to the action taken by the Local Government Board with regard to the buildings, but there is no doubt that local authorities are handicapped in carrying out their requirements; for while the private speculator is only restricted by the bye-laws of the authority as to the class of building and the construction thereof, the Local Government Board raise all sorts of difficulties, and require a standard of building which no local authority can insist upon in its own district. In the erection of the Municipal Lodging House we feel that the Corporation will supply a real want, and that a large number of single men engaged in the Docks and amongst the shipping of the Port will avail themselves of the accommodation. The present common lodging houses in the town, although regularly inspected, and kept in as good and clean a state as circumstances will permit, are not models of comfort.

Port Sanitary Authority.

The Port Sanitary Authority exercises a wide jurisdiction, extending from the Solent, up the Hamble River, the Itchen, and the Test, a course altogether of about 25 miles, and includes Eling, Redbridge, Hamble, and Bursledon in its area. Up to the year 1892 the Administration of the Port was

separate and distinct from that of the Borough, but in that year the two were combined. The duties carried out by this Authority have an important bearing, not only on the health of the town itself, but on that of the whole of the country, and we have often been hardly pressed to keep a careful look-out and be prepared in an hour's notice to take charge of any imported infectious case. At the present moment we are prepared for any emergency. An inspector is always on duty, or is in telephonic communication with the Medical Officer of Health, who, when apprised, proceeds in the Corporation Steam Launch to the vessel off Netley Hospital, and has any case of infectious disease removed to one of the Floating Hospitals, the vessel and any of the crew who may have been in contact with the infected person are disinfected, the names and addresses of all on board are taken and forwarded to the Medical Officers in those localities, and the vessel proceeds to Dock. The whole proceedings are carried out as expeditiously as possible, loss of time to the owners of the vessels is avoided, and the danger of infection being carried ashore is reduced to a minimum. In carrying out these duties the utmost assistance is rendered by the great Shipping Companies using the Port, and it has been the great desire of the Corporation and its Medical Officer of Health to preserve that feeling of harmony which has now existed for many years. In connection with this matter I cannot but think—and I believe the feeling is shared by all Port Sanitary Authorities—that we who guard the doorways of our country are hardly dealt with by the Imperial Government in having locally to bear the whole cost. It will be within your recollection that we have made attempts to obtain a remedy, but Chancellors of the Exchequer are proverbially obdurate. It does, however, rebound to the credit of the Local Authorities that they show such devotion in carrying out unaided a national duty.

Time will not permit me to speak of matters, other than sanitary, which the Corporation have taken up, but I may say it has shown its wisdom in purchasing the Electric Works and also the Tramways, from both of which sanguine expectations have been formed as to their future development, and the financial assistance they will render to the necessarily unremunerative expenditure in other departments.

I feel that it would be unwise on my part to further detain you from the important business before us. I am sure that from the papers that will be read and the discussions thereon, much profit will be derived, which will be greatly to the advantage of the Authorities we represent.

CONFERENCE OF PORT SANITARY AUTHORITIES.

ADDRESS

By Millar Wilkinson, C.C.,
Chairman Port of London Sanitary Authority.

PRESIDENT OF THE CONFERENCE.

Allow me, in the first place, to express my keen appreciation of the honour done in selecting me as the President of so important a Conference; and, in the second place, to extend a hearty welcome to you who meet me in this ancient city to discuss matters of vital importance, in connection with which Southampton has always taken a most enlightened and advanced position.

Whatever the result of your deliberations may be, one thing is certain, and that is that the interchange of views, and the free ventilation of ideas, must add to our sum of knowledge, and therefore tend to the public benefit.

This is the main object of these Conferences, and to this extent, at any rate, they have been, and I trust still will be, eminently successful.

Port Sanitary Authorities are practically new bodies, and have so far had to make their position clear in the face of great opposition. Before the Public Health Act, 1872, port sanitary work, except in a casual and haphazard way, did not exist, and until quite recently was not as a rule marked by any real energy.

As the Chairman of the Sanitary Authority of an important port I have often been surprised at the small amount of attention given by the general public to our work, and the little grasp of its real value and utility.

Sanitation in the mercantile marine is undoubtedly a long way behind sanitation on shore, and although many of our leading ship-owners are ready—as they always have been—to forego a certain proportion of their profits to add to the comfort of their employés, still, even to-day, Merchant Jack's life is surrounded with discomforts and hardships which make it

more and more difficult to obtain a suitable supply of *British* seamen for our great mercantile marine, of which the country is so proud and which it does so little to assist.

The sailor still sleeps, eats, and lives in a space which, according to law, need not exceed 72 cubic feet—a space, moreover, which has to include his bunk, bedding, and all his belongings—too often badly lighted, badly ventilated, and imperfectly warmed.

I say many of our foremost ship-owners are men of sterling principles, and do what they can in this direction. These men want leading only. They are, however, too often influenced by the *non possumus* attitude of their superintendents and overlookers—as a rule retired ship-masters are saturated with conservative principles—proverbially their characteristic. To many of them the idea of seamen being provided with a place for meals, or arrangements for washing apart from their sleeping quarters is preposterous. They never had these things, why should others want them?—and so on.

Again, there are shipowners who either know or care little for the health of their crews, and these require coercion. In many points the law, and especially the procedure, is weak and uncertain. This requires, and will doubtless receive, your consideration.

It must never be forgotten how potent a factor our mercantile marine is in the dissemination of disease. Not only do vessels pass from every port of the known world to our shores, but the seaman who inhabit them to a large extent frequent the lower, more crowded, and less sanitary parts of the towns. Thus they are not only liable to contract disease, but also to import it into places where our protection is least complete. This is a most important point. Against such importation of disease the Port Sanitary Authority is the only protection. The Government, in refusing to grant subsidies to Port Sanitary Authorities, gave as a reason that the work was a local one. Surely, if ever there was an imperial and national work, it is that of defending tho Empire against "plague and pestilence." All this is carried on by Port Authorities at a constant and continuous heavy expense, with the certainty that, sooner or later, such expense will be enormously augmented to protect the nation against the danger from its vast mercantile marine, from which the whole country in a large measure derives its wealth.

Gentlemen, I will not weary you with details, one point only, and that is the necessity for a largely increased cubic space for seamen. Upon this, we are all agreed, and upon its legislative enforcement we must insist. Again, the sanitary arrangement of the vessel should be submitted to the Port Authority and

its medical officer for approval, and plans should be shown in the same way that building plans are shown. At present these are carried out in a haphazard way, and space is wasted that might be utilized.

I am happy that in the case of London, some of our large ship owners have already adopted this course voluntarily, and have submitted plans to the Medical Officer of Health, for criticisms and suggestions, and that such suggestions have been acted upon with marked advantage. Where a procedure has been shown to work voluntarily, much of the difficulty in compulsion has been got over, and there is no reason why the rule should not be universal.

It has often been suggested that different ports would have different ideas.

This uniformity, however, has practically been secured already by means of such conferences as the present, and it would be a very simple matter to secure this even in the smallest detail.

I have touched lightly and generally on important questions —questions which directly make for the maintenance of our great merchant navy, and thus indirectly for the integrity of our great Empire, and I now leave the consideration of these and other matters in your hands, trusting only that such consideration will tend to strengthen our hands in safe-guarding the public weal.

CONFERENCE OF MEDICAL OFFICERS OF HEALTH.

ADDRESS

BY T. ORME DUDFIELD, M.D., M.R.C.S., L.R.C.P.

PRESIDENT OF THE CONFERENCE.

(FELLOW).

WHEN my connection with public health work in Kensington began (not in an official capacity) in 1865, London was practically destitute of public hospitals for the infectious sick; notification was non-existent. Now, the metropolis is well supplied with hospitals, and soon we shall have completed the tenth year of compulsory notification. I propose to tell how the notification powers were obtained, and how the hospital system was built up, from small beginnings, so as to be now nearly adequate for the requirements of a population exceeding four and a half millions. Should what follows seem to partake too much of the nature of a personal narrative, I would crave your indulgence for a course inevitable in the circumstances.

Notification.—Before the passing of the *Infectious Disease (Notification) Act*, in 1889, information of infectious disease seldom reached the Medical Officer of Health in time for effective preventive measures. My first efforts, in 1871, were directed to extend the sources of such information. For many years previously the Registrar-General had sent to medical officers the sub-district registrars' lists of deaths, on which the "Weekly Return of Births and Deaths in London" is based, but the information they contained, of great value in many ways, arrived too late to be of much service in aid of preventive work. I arranged, therefore, with the registrars, for a daily return of deaths registered from scarlet fever, diphtheria, "fever," and small-pox, an epidemic of which, unparalleled in modern times, was then raging. Information of infectious illness was solicited at general hospitals and dispensaries and from medical practitioners. In course of time the London School Board, the Police and the Postal authorities, successively, added their quota of information. But the greatest assistance was derived from the Board of Guardians through the relieving officers, who

held the keys of the hospitals; and until 1889, every case of infectious disease amongst the poor, whether sent to hospital or treated at home, was duly reported. In these several ways a considerable body of information was collected, but only with respect to a minority of total cases, if one may judge from the fact that the larger proportion of fatal cases (other than of small-pox), remained unknown until after registration of death.

Compulsory Notification.—Huddersfield enjoys the distinction of having first obtained compulsory powers, in a Local Act, in 1876. In immediately successive years, and before 1881, similar powers were conferred on Bolton, Burton-on-Trent, Nottingham, and the Sanitary Authorities of other towns, &c., to the number of about seventeen. Parliament readily granted notification powers to individual municipal corporations, &c., but no attempt was made to pass a general Act. The Sanitary Authorities in London were destitute of power to promote legislation. There was no central authority to help them, and, as we shall see, it took many years to persuade the Local Government Board to take action.

Conference of the Sanitary Authorities.—The first attempt to unite the Vestries and District Boards in a common effort, was initiated at the close of the year 1880. I had made an inquiry into the working of the system in the notification towns, the results of which were summarised in a special report. The Kensington Vestry forthwith resolved to convene a Conference of the Sanitary Authorities, with a view to joint action on this and cognate subjects. I was authorised to prepare a Memorandum setting out the advantages to be expected from notification, together with the draft resolutions intended for submission to the Conference. These documents were sent to each of the three thousand members of the Vestries, &c. The Conference, held at the Town Hall, 23rd March, 1881, was characterised by singular unanimity, each resolution after full debate being adopted without dissent. The notification resolution was as follows:—

> "That in the interests of public health, and to enable Nuisance Authorities to discharge the duty of checking and preventing the spread of infectious diseases, such as small-pox, scarlet fever, &c., provision should be made by legislative enactment to secure the compulsory disclosure to the said Authorities of all cases of such diseases immediately after their occurrence."

The other resolutions were in favour of free hospital treatment of infectious diseases; compulsory removal, when necessary; depauperisation of medical relief in the hospitals;

maintenance of the hospitals out of a Metropolitan Common Fund, &c.* It was the first occasion on which the combined Sanitary Authorities had accepted these principles in relation to the control of infectious disease.

In view of the Conference, the subject of notification, in particular, had been brought to the attention of the Society of Medical Officers of Health, the Parliamentary Bills Committee of the British Medical Association and the Councils of the Social Science Association and thé National Health Society, all of which accorded their support to the movement. The Metropolitan Poor Law Guardians' Association also passed a resolution in favour of the principle, and the Asylums Board gave their adherence in a communication addressed to the Local Government Board. The Conference had resolved to ask the Board to receive a deputation for presentation of the resolutions, and to invite the co-operation of the several bodies above named, which was cordially given.

Deputation to the Local Government Board. The Deputation was received by the President 23rd April,† having been introduced by Mr. Hastings, M.P., and Dr. Farquharson, M.P. The resolutions were spoken to by Major-General Boileau, R.E., F.R.S. (Kensington Vestry), for the Sanitary Authorities, and by Dr. Alfred Carpenter, J.P., Dr. Bristowe, F.R.S., Mr. W. H. Michael, Q.C., and Mr. Ernest Hart, for the British Medical Association, the Society of Medical Officers of Health, the Social Science Association, and the National Health Society, respectively. The President promised consideration of the subjects brought to his attention, but the prospect of securing notification did not appear to have been brought much nearer as the result of the Conference. Good seed, however, had been sown: public attention had been roused, and notification was advocated in *The Times* in a powerful leading article.

Hope Deferred.—But eight years were to pass before, as the result of a further joint effort by the Sanitary Authorities, and other influences, notification powers should be secured. In the interval utterances of weight in support of the principle were not wanting. Dr. (afterwards Sir) George Buchanan, F.R.S., Medical Officer to the Local Government Board, in his annual report for 1881-2 expressed willingness to see the power given to any authority who, "having made adequate arrangements for securing isolation and disinfection, . . . was prepared to put it to effective use." In 1882 the British Medical Association,

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* *Vide* the Resolutions, page 420, *foot note.*

† The proceedings at the Deputation were reported in the *British Medical Journal* 7th May, 1881.

at its Jubilee Meeting at Worcester, passed a resolution in favour of notification, and in the same year the Royal Commission, as the result of their inquiry respecting small-pox and fever hospitals, recommended its adoption.

Parliamentary Action.—No Session between 1881 and 1888 passed without legislation which added to the list of towns where, under local Acts, notification was brought into operation. All Bills of this sort were referred to the Select Committee on "Police and Sanitary Regulations." The Committee of 1882 reported that "the time had come when provisions of law upon this subject may be sanctioned, at least, in the more important Urban Sanitary Districts"—it did not seem to occur to anyone that London came within this definition—and they framed a Model Clause, which was adopted in subsequent Acts. At or about this time the Local Government Board ascertained by inquiry that the authorities of towns where notification was in force were uniformly satisfied of its usefulness, and that it had materially contributed to check the spread of infectious disease. In 1882, and again in 1883, Mr. Hastings and other Members introduced a General Bill—without success. In support of the 1883 Bill, a deputation promoted by the Social Science Association was received by the President of the Local Government Board, who, whilst admitting the value of notification, declined to adopt the Bill in "fear of going at all in advance of public opinion." A so-called Vigilance Association [illegible] Whitehall in opposition to the Bill, [illegible] interference with the liberty of the subjec [illegible] fact that democratic peoples are the m[illegible] interference, when the exercise of [illegible] individual threatens danger to the welfare [illegible]

[illegible] *Notification.*—In Kensington, as [illegible] information of infectious dise[illegible] was obtained by, as yet, unpaid voluntary notification. [illegible] ascertaining with what effect, I collated [illegible] twenty-four years, comparing two periods [illegible] period, 1859-70, without notificat[illegible] of any kind, and (a necessary qualification!) without hospit[illegible] the second period, 1871-82, with voluntary notification a[illegible] hospitals. In the second period, after correction for incre[illegible] of population, there had been a reduction in deaths from [illegible] seven principal diseases of the zymotic class to the number 1441, or 120 per annum, the decrease in scarlet fever (878) a[illegible] enteric fever (448) being especially notable. The only not[illegible] able disease that showed an increase (135 deaths) w[illegible] small-pox.

Renewed Action of the Sanitary Authorities.—In 1887 a fresh combined effort was made by the Sanitary Authorities. Suitable resolutions having been adopted (21st September), the Vestry requested the Local Government Board to bring in a Bill, general or local, *i.e.*, Metropolitan. The movement was again supported by the Vestries and District Boards generally, by the Society of Medical Officers of Health, and by the Asylums Board. Provincial opinion was elicited in support of the principle of notification at the annual meeting of the Association of Municipal Corporations, held at the Guildhall, London; a resolution having been passed asking the Local Government Board to introduce or give active support to a Bill. The Vestry's communication was simply acknowledged.

Voluntary Notification Perfected.—On 5th October, 1887, the Vestry, upon my advice, resolved to perfect, as far as practicable, the system of voluntary notification. Medical practitioners were invited to report to me cases of small-pox, scarlet fever, diphtheria, and "fever," on forms supplied for the purpose; a half-crown fee being paid for each notification. As at this time patients were being admitted to the hospitals of the Asylums Board on the application of registered practitioners, the Vestry, with a view to accelerate removal, decided to pay an additional half-crown fee for the medical certificate required for the ambulance nurse, as well as the cost of a telegram, in respect of every patient removed direct by the practitioner notifying the case. A considerable increase in the number of notifications naturally followed. The fee for the medical certificate, as well as the cost of the telegraphic application for removal, is still paid, the result being that about a moiety of our cases are already in hospital when the (now compulsory) notification certificate comes to hand. A delay of two days in removal and disinfection, is thus often averted, as when the practitioner sees and removes a case in the forenoon of Saturday. But to resume.

Action of the Local Government Board.—Towards the close of the year 1887 it became apparent that the effort made by the Sanitary Authorities, etc., had not been altogether without effect. The Local Government Board decided to institute a further inquiry into the working of the system in the notification towns—not far short of sixty, and having a population equal to that of the Metropolis. There could have been no doubt as to the character of the information that would be obtained. Early in 1888 the President had an object lesson at Sheffield, where small-pox was rampant; and having to make a speech there, he announced his intention to introduce a Notification Bill—but he did not during the then ensuing session; in which, however,

Mr. Hastings and other members brought in a Bill, *Public Health (Prevention of Infectious Disease, etc.)*, which shared the fate of previous measures.

Compulsory Notification Obtained.—In 1889 the long-wished-for measure was introduced by the President of the Local Government Board—under the title *Infectious Disease (Notification)*. It passed both Houses with practical unanimity, as probably it would had it been introduced in 1881, immediately after the Kensington Conference. Notification was made compulsory in London, the Act being adoptive for the rest of the country. Many members desired that it should be compulsory for England and Wales. The President was willing, but was deterred by the threat of opposition. As an adoptive measure the Act was made applicable to Ireland also, at the request of the Irish members. Its success was great and immediate. Year after year more and more Sanitary Authorities adopted it, till, in the recent session, when compulsory notification was made general by the *Infectious Disease (Notification) Extension Act*, a very small residuum of the Sanitary Authorities remained to be coerced.

Notification in London, 1889-99.—The subjoined table may be of interest as showing the amount of notification in the Metropolis since the Act came into force, 31st Oct., 1889.

Year.	Small-pox.	Scarlet Fever.	Diphtheria.	Enteric Fever.	Typhus Fever.	Other Continued Fevers.	Puerperal Fever.	Erysipelas.	Croup.	Cholera.	Relapsing Fever.	TOTAL
1889 2 months	8	3,292	973	689	16	57	43	795	156	1	-	6,032
1890	90	13,530	3,870	2,877	35	237	206	4,598	550	25	7	29,[illegible]95
1891	134	11,388	3,907	3,372	27	152	221	4,764	505	23	39	26,[illegible]22
1892	425	17,006	7,791	2,465	20	147	347	6,934	565	54	7	45,[illegible]49
1893	2,813	36,901	13,026	3,663	22	205	397	9,700	668	86	4	67,[illegible]85
1894	1,192	18,440	10,655	3,380	21	162	253	6,080	535	21	2	40,[illegible]21
1895	878	19,737	10,772	3,306	14	105	236	5,660	451	29	3	41,[illegible]11
1896	223	25,638	13,361	3,189	6	102	278	6,438	446	13	3	49,6[illegible]99
1897	590	22,876	12,811	3,113	4	65	264	5,801	388	38	1	45,4[illegible]56
1898	39	26,917	11,261	3,032	17	55	250	5,180	310	23	-	37,3[illegible]40
1899 7 months	16	8,723	6,268	1,296	8	32	165	2,669	189	—	-	19,3[illegible]
	3,969	206,368	98,997	30,562	190	1,319	2,660	58,619	4,763	313	66	409,8[illegible]

It only remains to add that, so far as I am aware, the Act has worked smoothly in London, and with singularly little sense of friction between medical officers and medical practitioners.

Hospital Accommodation.—The Sanitary Act, 1866 (Section 37) gave power to the Sanitary Authority to provide hospitals for the "sick inhabitants" of their district. This power probably would have been exercised but that *The Metropolitan Poor Act*, 1867, and the consequent formation of the Metropolitan Asylums Board, superseded, by the establishment of hospitals for the whole Metropolis, the need for local hospitals. The Asylums Board, it is true, were nominally appointed to make provision for the pauper class only—the "sick poor," persons "chargeable to unions and parishes"; but from the beginning they received "non-paupers" into the hospitals, the proportion of such cases, as stated long afterwards, being some 90 per cent. of the total admissions. They had, indeed, no option but to admit all who were sent by the Boards of Guardians, and these bodies, for the most part, exercised a wise discretion in granting orders of admission to all applicants. At the outset the Managers of the Asylums Board must have contemplated the provision of accommodation on a large scale, judging from the extensive sites acquired in different parts of the Metropolis—sites then adequate for hospitals for "persons of all classes whose isolation was necessary for preventing the spread of disease." The first hospital, at Hampstead, was opened, in 1868, for relapsing fever: in December, 1870, it was utilised for small-pox. The second and third hospitals, at Stockwell and Homerton, were opened, in 1870, also for small-pox—the most fatal epidemic of modern times then raging. In fourteen months—December 1st, 1870, to January 31st, 1872—nearly 14,000 cases of this disease were admitted to the Board's hospitals, and in the ensuing twelve months an additional 2,400. In 1871, eight thousand persons died from this cause in London. The deaths in the Managers' hospitals in the fourteen months were 2,557, and in the following twelve months 467. Admittance was obtainable only on the order of a relieving officer, or the master of a workhouse, and on the certificate of a Poor-law medical officer. Given good relations between the Sanitary Authority and the relief authority, there was no difficulty in procuring orders for non-paupers to the full extent of available accommodation. Such relations happily existed in Kensington.

Deficiency of Hospital Accommodation.—In the early years of the Board's operations, the hospitals did not find favour with the general public: people naturally shrank from going to the relieving officer for an "order," to be followed, necessarily, by a visit from the parish doctor; and so the hospitals were not in request, save when small-pox was epidemic. Then the demand for accommodation usually exceeded the supply. Such

a crisis befel towards the end of 1876; and on 2nd January, 1877, the Local Government Board addressed a communication to the Vestries and District Boards, defining the classes for which the hospitals were intended, and asking what provision they had made, or proposed to make, for non-paupers under the 37th Section of The Sanitary Act, 1866?

It became my duty to report on the subject; and on the 10th January, 1877, and, subsequently, in a communication (by way of reply) to the Asylums Board, I expressed myself in favour of—

1. Unity in Hospital Administration for all classes of the community: a Central Board—the Asylums Board if it were dissociated from pauperism; otherwise, a new Board, formed on the model of the Metropolitan Board of Works and representing the Sanitary Authorities.
2. Free admission to the hospitals of all persons in need of isolation.
3. De-pauperisation of relief in hospital.
4. Maintenance of the hospitals out of a metropolitan rate or common fund.

I had already, in 1875, submitted to the Local Government Board, but without result—

(*a*) That the Medical Officer of Health should be empowered to give the order for admittance of the patient to hospital; and

(*b*) That the certificate of any registered practitioner should be accepted as evidence of the nature of th infectious disease.

In 1871, my contention, with regard to the maintenance patients in hospital, was, that the precedent of vaccinati legislation should be followed in regard to the disease whic was the object, and in the vast majority of cases the effe of vaccination to prevent. People, I said, were vaccinated the public expense, all charges being defrayed out of the po rate, in order to lessen the risk to the community of the spr of small-pox, justly regarded as a public danger. Was reasonable, I asked, to pauperize the man who submitted isolation in the Board's hospital as much for the public go as for his own benefit? Exaction of payment, on the ot hand, would be fatal to any scheme which aimed at the isolat of all suitable cases. To provide isolation in local or distr

hospitals, as recommended, would be to empty the Board's hospitals. Both sets of hospitals would be alike "rate-supported"; it was merely a question of taking the money out of one pocket or the other. The Managers had nearly met the requirements of the Metropolis: the only question was, should they continue to do the work, or should the task be taken up by the Sanitary Authorities? And my advice was, that the wisest course would be to ask the Managers to go on providing whatever accommodation might be required for all classes, as they had done to the extent of 2,000 beds in the epidemic of 1870–72, when they were able to say that they had not turned a sick case from their doors.

The Managers were willing to assume the rôle of Central Hospital Authority, and it would have been well had they at that time been clothed with the necessary powers. But practically nothing then came of the discussions to which the letter of the Local Government Board (2nd January, 1877) had given rise.

Conference of the Sanitary Authorities.—The Limehouse District Board of Works convened a Conference in 1878, for consideration of the hospital question. It became apparent at the first meeting that many of the delegates were not very well informed on the subject. The Vestry, therefore, reprinted my Report on "Hospital Accommodation for the Infectious Sick" (1877), which was sent to each delegate, together with a set of "Propositions" embodying the views they had themselves adopted, as follows:—

> "1. That the provision of hospital accommodation for the large class of persons whose isolation in hospitals is necessary for preventing the spread of infectious disease, can be best made in a comprehensive and systematic manner by one Central Authority acting for the whole Metropolis.*
>
> "2. That the Metropolitan Asylum District Board should be such Central Authority, the Managers already having, in the several hospitals erected under their auspices, nearly sufficient accommodation to meet the requirements of the sick of all classes—excepting those who may be able and willing to pay for hospital treatment, and for whom provision is already made, or could be made, at the London Fever Hospital, and the London Small-pox Hospital.
>
> "3. That steps should be taken to obtain an Act of Parliament to alter the constitution of the Metropolitan

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* The first "proposition" endorses the view expressed by a Committee of the Asylums Board, in a Report issued in 1877.

Asylum District Board, by severing its connection with pauperism, in so far as relates to the treatment of infectious disease; and by providing for the election of a certain proportion of the Managers by the several Vestries and District Boards of Works, the Sanitary Authorities within the Metropolis.

"4. That pending such legislative action, and seeing that the hospitals of the Managers have been established at the public cost and for the common good, no compulsory payment should be exacted from any persons whom the Sanitary Authorities may deem it necessary or expedient to remove to the hospitals for the sake of isolation, and all expenses incident to the maintenance of such persons in the hospitals should be defrayed out of the general rate.

"NOTE.—Under the proposed altered constitution of the Board the hospitals should be supported out of a Metropolitan rate, or power might be given to the Managers to issue precepts on the several Sanitary Authorities for their quota of the expenses.

"5. That admission into the hospitals of persons suffering from infectious disease should not involve the loss of any political or other rights by the said persons.*

"NOTE.—It is proposed to place the treatment of infectious disease on the same footing as Public Vaccination. In other words, admission into the hospitals should not be deemed to be parish or poor relief. It has been ascertained that on the 15th February, 1877, the proportion of patients in the several Asylums who acknowledged to having previously received parochial relief was under ten per cent.

"6. That in order to facilitate the 'stamping out' of infectious diseases, provision should be made for the disclosure to the Sanitary Authority of all cases of such diseases in such manner as to the wisdom of Parliament may appear most expedient."

These views were favourably received by the Conference, but the only formal resolution passed related to the hospital question, and was in favour of a "Single Authority acting for the whole Metropolis to provide accommodation for persons suffering from infectious disease, such Authority to be, as far as possible, representative."

Deputation to the Local Government Board.—The resolution

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* A great stir arose in 1878, owing to an attempt made, in the Tower Hamlets division, to disfranchise a voter whose child had been sent to hospital suffering from small-pox. The attempt failed, but it had good effect, and ultimately led to the de-pauperisation of medical relief in the Board's Hospitals, by Section 7 of the *Diseases Prevention (Metropolis) Act, 1883.* My report on this case was sent to each of the delegates, and largely circulated not without effect.

of the Conference was (in March, 1879) submitted to the President of the Local Government Board, who was requested, and consented, to introduce a Bill to enable the Sanitary Authorities to enter into contracts with the Asylums Board for the reception of non-pauper cases. Effect was given to this proposed arrangement in *The Poor Law Act*, 1879, section 15 of which enacted that "any person admitted to hospital, and not being chargeable, shall be deemed to be maintained by the local authority sending him; and the expenses incurred shall be due from him, or his representatives, at any time within six months after his discharge from hospital." It was a technical means of de-pauperising relief in hospital, a principle to which effect was finally given in *The Diseases Prevention (Metropolis) Act*, 1883 (Section 7).*

Opposition to the Contract System.—Believing that if the contract system were adopted, and payment exacted from patients, the results could not fail to be detrimental to the interests of public health, I opposed it in reports which were sent to the Sanitary Authorities, the Asylums Board, and the Medical Officers of Health. The hospitals were already free to us, the Board of Guardians having, at my request, instructed the relieving officers to abstain from making application for payment by or on behalf of patients, such application having more than once led to retention of "mild" cases of small-pox at home with disastrous results.

The opposition was successful: few Sanitary Authorities signified willingness to enter into contracts; the Asylums Board informed the Local Government Board of the fact, and the Act, as regarded this particular matter, happily proved abortive.

The Small Pox Epidemic of 1881.—With the decline of the small-pox epidemic of 1876-77-78, interest in the hospital question subsided for a time, only to suffer a rude awakening when the epidemic of 1881 plunged all parties into new and greater difficulties—happily the last of their kind. No fewer than 8,551 cases were admitted to the Board's hospitals during the year, of which 1,417 proved fatal; the largest totals since 1871.

The epidemic was at its height when the joint deputation, arising out of the Kensington Conference (March 23rd), waited upon the President of the Local Government Board (April

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* The Poor Law Act, 1889, Sec. 3 (1), authorised the admission to the hospitals of non-paupers. The Public Health (London) Act, 1891, repealed and re-enacted the provisions of most of the Acts referred to, so far as they related to matters dealt with in this address.

23rd), to submit the resolutions adopted thereat.* The President, observing that the hospital question was underlying the whole of the subjects brought to his notice, asked what advice the Sanitary Authorities had to offer with a view to dealing with the then pressing emergency? The hospitals were full to overflowing, and hundreds of patients were detained at home for want of accommodation. I had felt for some time that the solution of the small-pox hospital question would be found in removal of suitable cases to sanatoria in the country, and had brought the subject to the attention of the Asylums Board and the Society of Medical Officers of Health. The Society endorsed my views and addressed a letter to the Board which the Managers forwarded to the Local Government Board. At the request of the deputation I replied to the President's inquiry, and recommended the provision of temporary hospitals, huts or tents, outside London, and the removal thereto of all suitable cases; predicting that if this course were adopted the difficulty in which the Managers found themselves would vanish. On 7th May, the Board recommended this course to the Managers, indicating the spare land adjacent to the Darenth Imbecile Schools and Asylum as a suitable site for a Camp Hospital. The proposal to use this site originated with Sir E. H. Currie, Chairman of the Schools Committee. On May 9th, the Managers met to consider the Local Government Board's recommendation, and a report of the Darenth Committee intimating that accommodation could be provided for at least 300 cases. The Managers authorised the Committee to erect

* The first resolution dealt with Notification (*vide* page 410); the others were as follows:—

"2. That the provisions of the 26th Section of the Sanitary Act, 1866 (Sec. 124 Public Health Act, 1875), are insufficient for the protection of the public health, and should be so amended as to empower any justice to direct the removal to a hospital within the district of the Nuisance Authority, of any person suffering from any dangerous infectious disorder, and being without proper lodging or accommodation, which would enable him to be properly isolated, so as to prevent the spread of disease to other inmates of the same house, or to be properly treated.

"3. That the admission into hospitals for the purpose of isolation of persons suffering from infectious disease, and being without proper lodging or accommodation, is eminently desirable in the interests of the public, and should be encouraged; that payment for the assistance given in hospitals to such persons, removed thereto for isolation by the Nuisance or Poor Law Authority, should not be enforced; that the giving of such assistance should not entail on the recipient the loss of any social or political status; and that the cost of hospital treatment of such infective sick person should be made a charge on the Metropolitan Common Poor Fund."

Objection to free treatment in hospital ceased when I showed, as the result of a special inquiry, that in a period of twelve months, the guardians of twenty unions had received less than £60 on account of the maintenance of seventy-nine patients out of 3,100, the total number admitted from the said unions.

tents and make other necessary arrangements. The sanction of the Local Government Board was given, and on 11th May the first batch of convalescents was dispatched. By 9th June 640 patients were under canvas or in wooden huts, and, in all, 2,400 cases were received during 1881. The success of the plan was instant and complete. The pressure on the town hospitals ceased. Accommodation was found for all applicants. The small-pox hospital difficulty was solved.

The Royal Commission.—Another event of importance marked the year 1881; the appointment of the Royal Commission to enquire respecting small-pox and fever hospitals—due largely to the disquiet caused by Mr. Power's Report on the Fulham Hospital, in which the fascinating (but possibly delusive) theory of aërial convection of small-pox material found its most eloquent exponent. The subjects referred to the Commission were practically identical with those with which, in many published reports, I had been dealing during the preceding five years. My evidence, based on a series of Memoranda previously submitted to the Commission, occupied the time of nearly two sittings. The conclusions come to by the Commission were set out in "practical recommendations" which endorsed the principles in relation to the management of infectious disease for which I had so long contended. Among them—Compulsory notification; Unity in hospital administration—one authority for London as a whole; Separation of hospital treatment from connection with pauperism—abolition of distinction between pauper and non-pauper; Hospitals, free to all and maintained out of a metropolitan rate or common fund; Additional hospitals to meet the requirements of all classes; Convalescent hospitals out of town for cases of small-pox and for fever convalescents; Transference of control of vaccination from the Poor Law guardians to the Sanitary or Hospital Authority.

Results of the Enquiry.—For compulsory notification London had to wait seven years. Unity in hospital administration has long been an accomplished fact, the Asylums Board being the hospital authority. De-pauperisation of relief was effected in 1883. Free hospital treatment was secured by the *Poor Law Act, 1889*, Sect. 3 (3), which in effect devolved the charge for maintenance of patients upon the Metropolitan Common Poor Fund. Additional hospitals have been provided, and to an extent far beyond the recommendation of the Commission,—which the Asylums Board thought to be excessive so late as 1886. A country hospital for small-pox was provided before the appointment of the Commission; a convalescent fever hospital subsequently to their report. The control of vaccination, unfortunately, is still in the hands of boards of guardians,

too many of which have been faithless to their trust. It is time, surely, that it were transferred to the Sanitary Authorities, and the Conference may think it well to express an opinion to this effect.

District Hospitals.—The report of the Commission finally settled the question of public *versus* local or district hospitals. A few Sanitary Authorities had, at one time or another, provided temporary hospitals, of a sort, only to have them closed by local opposition and injunction. Not one now exists. Against fever hospitals no valid complaint has ever been raised. In respect of small-pox the case was different. It is only necessary to recall the prolonged litigation in the Hampstead Hospital case. Fulham Hospital was also made the subject of litigation, terminated by a compromise limiting the number of patients. The powers of the law were invoked, happily in vain, sometime after the Darenth Camp Hospital had proved its usefulness. But the decision in the cause *Fleet* v. *The Managers* brought the troubles of the Asylums Board in this respect to an end.

Effect of Removal of Small-pox Patients.—The plan inaugurated, May, 1881, of removing mild and convalescent cases out of town was gradually extended, and perfected in the latter half of 1885. Experience had proved that patients bore removal well,* and the Asylums Board determined to transfer all cases direct from their homes to the Hospital Ships and the Darenth Camp. This course was followed by rapid decline in the number of cases admitted; and since that date small-pox has ceased to be a terror to Metropolitan Medical Officers of Health. So far, indeed, it has since shown itself the most controllable of infectious diseases, and the least fatal. In 1871 it killed 8,000 people in London, the population being $3\frac{1}{2}$ millions. In 1898 there was but one death in a population of $4\frac{1}{2}$ millions: the actual cases were 5, or 1 per million. In 1881 the deaths were 2,400, and in the next four years, successively, 430, 136, 1,236, and 1,419. In 1886 (the first year in which all cases were sent to the country) the deaths fell to 24. Only in one year since (1893) has small-pox given any trouble. In that year the disease was repeatedly imported by tramps and others: 2,376 cases were admitted to the Manager hospitals. The deaths were 206, of which 180 took place at th

* At the close of 1885 the River Ambulance Service had conveyed, 23 months, 11,060 patients to the Hospital Ships and Camp (irrespective 10,076 recovered persons who were brought back to the London Wharve these persons, "of both sexes and all ages, for the most part in physi suffering, and many helpless from disease, were carried in all weathers throughout all seasons of the year, and to a great extent through the ho of darkness, without detriment to the patients, and without accident mishap to any person whatever."—*Report of the Ambulance Committee.*

hospitals. In the twelve years 1886-1897 the total deaths from this cause were 469, as compared with 18,336 in the twelve years 1871-82. Had the mortality in the second period been as high, relatively to population, as in the first period, not 469, but 21,780 persons would have died. And this reduction was concurrent with an ever-increasing neglect of vaccination.

Necessary Amount of Hospital Accommodation.—The Royal Commission, in 1882, recommended acquisition of sites sufficient for the accommodation of 2,700 small-pox cases. Sites adequate for this number have been acquired, and before long the Asylums Board will have 1,900 beds. I have hope that no such number will be required, and that the small-pox hospitals will, in the main, be used henceforth as convalescent fever hospitals. The Commission recommended provision of 3,000 beds for "fever"—half in London, and half, for convalescents, out of London. At the middle of 1887 the beds at fever hospitals were about 1,400—all the town hospitals having been appropriated for fever. Between 1882 and 1886 the cases in hospital at one time had never exceeded 800; and the Managers truly stated that experience subsequent to 1882 had not justified the recommendation of the Commission. The experience came in 1887, when scarlet fever was epidemic. All the hospitals had to be opened. Plaistow Hospital (erected by the Poplar District Board at a cost of £18,000, but never furnished) was hired, the Northern Convalescent Hospital was brought into use, and temporary huts were erected at three of the town hospitals. In all, 2,700 beds were provided, and 2,600 were occupied at one time. Of 6,500 patients admitted (nearly 4,000 in excess of any previous year) 5,900 were suffering from scarlet fever. This period marked an epoch in the history of the hospitals. They had become popular.

Mode of Admittance of Patients.—Patients were at this time admitted upon the application of any registered practitioner: since 1893 they have been admitted upon the application of any person whatsoever.* The certificate of any practitioner was accepted, an Order *legalising* this practice, recommended by me in 1875, having been issued by the Local Government Board, in 1887; years after the acceptance of such certificates had become the practice of the Asylums Board. Shortly after the Notification Act became law in 1889, I initiated the practice of using the notification certificate as a medical certificate for

* "In order to give to the poor every facility for making their application for the removal of patients, they are allowed to apply at the Board's offices, either personally or by letter, or by telegram or by telephone, or at any of the several Ambulance Stations, personally or otherwise, or through the Sanitary Officials of their districts, or Relieving Officers, or through any other channel."—*Memorandum by the Clerk to the Board, November, 1893.*

the ambulance nurse—thus saving much time in the removal of patients. In 1893 the Asylums Board (with the view of facilitating the prompt removal of patients) formally sanctioned the practice.

Increased Use of the Hospitals.—Relief in hospitals was now free from the taint of pauperism, and it was certain that the demands on the Managers would increase; with what rapidity remained to be seen. In 1891, the mortality from scarlet fever [illegible] deaths) was the lowest on record, and yet the admissions [illegible]2) were only 650 fewer than in the epidemic year 1887. In 1892, notification being in operation, the admissions exceeded 13,000, being 7 [illegible] in 1887, and yet the deaths (1,174) were 26[illegible] below the decennial average. [illegible]h was the gro[illegible]e hospitals, that in this year, [illegible]2, I expressed [illegible]at it would be necessary to [illegible]vide "not less t[illegible] for scarlet fever, 'fever,' and [illegible]htheria"—first [illegible]8.* This number was deemed [illegible]cessive. In 18[illegible]ub-committee of the Asylums [illegible]ard thought 4,[illegible] be provided. At the present [illegible]e the actual am[illegible]ed accommodation for fever [illegible]ients, irrespectiv[illegible] beds available at the Gore [illegible]m Convalescent [illegible]Iospital, exceeds 6,000 beds, [illegible]nt is as follows:—

Hospital Accommodation; Fever.—

	No. of Beds.	Opened.
North-Western Hospital, Hampstead	460	1868
South-Western Hospital, Stockwell	366	1870
Eastern Hospital, Homerton	356	1870
Western Hospital, Fulham	454	1877
South-Eastern Hospital, Deptford	435	1877
Northern (Convalescent) Hospital, Winchmore Hill, N.	752	1887
North-Eastern Hospital, Tottenham	386	1892
Fountain Hospital, Tooting	402	1892
Brook Hopital, Shooter's Hill	488	189[illegible]
Park Hospital, Hither Green	548	189[illegible]
	4647	

* The Asylums Board were willing, in 1886, to undertake the treatment o[f] diphtheria, but such cases were deemed inadmissible, as diphtheria di[d] not come within the definition of "fever." The Kensington Vestry invite[d] the Local Government Board (5th October, 1888) to promote legislation t[o] enable them to issue an Order legalising the admission of diphtheria. Th[e] Board promised to do this, and in *The Poor Law Act*, 1889, obtained th[e] necessary powers. Meantime, on 17th October, 1888, the Board, in effec[t] authorised the Managers to admit cases of diphtheria, which they di[d] forthwith.

		4,647
Further accommodation will be provided at :—		
Eastern Hospital	6	
Grove Hospital (nearly completed) Tooting	520	
Northern Hospital	12	
North-Eastern Hospital.......	128	
Southern Hospital (plans not yet approved), say	700	
		1,366
The Gore Farm Small-pox Convalescent Hospital, generally used as a convalescent fever hospital, can furnish beds to the number of		750
Grand total		6,763

Hospital Accommodation ; Small-pox.—

	No. of Beds.	Opened.
Hospital Ships. "Atlas"		1881
"Endymion"	300	1881
"Castalia"		1884
Gore Farm Convalescent Hospital (at present used as a convalescent fever hospital)	1,192	1890
	1,492	
At Joyce Green, adjoining the ships, a hospital is about to be erected for	400	
Grand total	1,892	

Distribution of Accommodation.—During 1898, the beds allocated to scarlet fever were 3,810, to diphtheria 1,319, to enteric fever 317. Many cases of the latter disease were removed by the Managers' ambulances, under arrangement, to general hospitals. To show the extent to which the public now avail themselves of the hospitals, it will suffice to say that last year the proportion of admissions to the total number of legally admissible (notified) cases was 65·5 per cent., against 33·6 per cent. in 1890, the first complete year in which compulsory notification was in force. Of scarlet fever cases notified, 74·1 per cent. were admitted ; of diphtheria, 62·4 per cent. ; and of enteric fever, 41·3 per cent. All of the small-pox cases were admitted. The total admissions, since 1870 to the end of 1898, have been, to the small-pox hospitals 63,513 ; to the fever hospitals 197,458 : grand total 260,971.

Ambulance Service.—A few words concerning the ambulance service and I have done. The ambulances until 1880 were provided in some districts by the guardians, in others by the Sanitary Authorities; sometimes by contract with cab proprietors, or undertakers! The arrangements were far from satisfactory. Those who are curious on the subject should read the excellent report of the late Dr. James Stevenson, Medical Officer of Health for Paddington, issued in 1877. This gentleman recommended *(inter alia)* "That the Managers of Hospitals for the reception of the infectious sick should supply the conveyances, with horses and drivers necessary for the removal of patients to such hospitals,"—primarily the Asylums Board, therefore. But the Managers were unwilling to take up the proposed task, nor did they when the *Poor-Law Act*, 1879, enabled them. The Royal Commission recommended, in 1882, "that the hospital authorities should have the entire control of the ambulances," and soon afterwards the Managers signified their willingness to assume the new function. The first ambulance station was established at London Fields, in 1883, but had to be abandoned as the result of legal proceedings. Subsequently, stations were erected in connection with three of the hospitals: a river service had already been provided for the conveyance of small-pox patients to the Hospital Ships and Darenth Camp. Power to provide riverside wharves was conferred by the *Diseases Prevention (Metropolis) Act*, 1883.

In 1884, I proposed to the Board that they should undertake the removal of all cases of infectious disease in London; but it was not until 1888 that they signified to the Local Government Board their willingness to undertake this duty. Soon afterwards, the President of the Local Government Board, in the *Poor-Law Act 1889*, obtained for them the necessary power. By the *Public Health (London) Act 1891*, (Sec. 70) it was made penal in London to use any public vehicle for the conveyance of persons suffering from infectious disease.

At the present time the Managers possess six land stations, at or contiguous to hospitals, three steamers, and three wharves. Of late years the river service has had little occupation. The land service comprises accommodation for 138 men and 150 horses: the vehicles number 147. The maximum of removals was attained in 1896, when 43,637 patients were removed from homes to hospitals, or between one hospital and another, or from hospitals to homes. The removals in 1898 were 35,043; the journeys made, 23,120; the miles travelled, 214,677. In eighteen years, 1881-98, the removals of patients numbered 348,000, including 35,559 cases of small-pox.

r by year the work of the Managers has grown, and ed in efficiency; for they have ever been ready to iseful suggestions. Legislation has followed consistently footsteps of their practice—legalising methods of ap- value to which, tacitly or explicitly, their sanction had iven. People in London, I think, hardly realise what we to the labours of this Board. Foreigners, whose ent is said to anticipate the verdict of posterity, are itly affected. So far back as 1886, a distinguished r of a deputation, civic and medical, sent from Paris ly the hospital system of the Managers, described it as ealisation of a dream of perfection."

CONFERENCE OF MEDICAL OFFICERS OF SCHOOLS.

ADDRESS

By C. E. Shelly, M.A., M.D., M.R.C.P., M.R.C.S.

PRESIDENT OF THE CONFERENCE.

I am sure that I shall be voicing your feelings as well as my own this morning if, in the first place, I endeavour to express our appreciation of the action of the Council of the Sanitary Institute in initiating this, the first, Conference of Medical Officers of Schools held in connection with its Congresses. I feel assured that we should be mistaken were we to regard this invitation to the Medical Officers of Schools merely as a compliment. It is much more than that. It is a public recognition—by a body eminently qualified to judge—of the most important aspect of the work which falls to the medical officer of every school—the prevention of disease, as contrasted with the treatment of the sick: and it is at the same time an equally public appreciation of the efforts which we, individually and collectively, are making to safe-guard our schools against illness which may enter them from without, and the public at large from illness which otherwise might reach their households from the school.

Every school, large or small, is a more or less isolated community: and in connection with each there confronts the Sanitarian the same array of problems which claim his consideration alike in the teeming city and the scattered hamlet. With these, so numerous and so widely recognised, I do not venture to detain you. But of the other, special aspects of the school I would allude to one or two of particular interest.

The peculiar feature—and from the Hygienic point of view the most important feature—of a school lies in the fact that it is a closely aggregated collection of young and immature members of the race, specially susceptible to illness—and peculiarly so to the commoner infectious maladies. Although in some senses it occupies an isolated position for about eight months out of every twelve, the school has numerous points of contact with the world around it: each of these may, at any moment, become an avenue of infection; and, although none can be absolutely safe-guarded, all of them may be intelligently watched. Are we familiar with any other combination of

circumstances which can furnish, under conditions so nearly constant and consistent, and in relation to material so immediately under observation and control, the data needed for investigating some of the most interesting problems of preventive medicine? For instance, the school-age is pre-eminently that during which the common infectious exanthemata are wont to be developed. But it is only comparatively recently that we have begun systematically to collect and compare the important material and observation which have hitherto so largely run to waste. It is thus that we have come more accurately to define the incubation periods and the infective duration of several maladies. We have gone even further: The susceptibility of the individual school-boy or school-girl depends upon whether he or she has secured immunity by a previous attack of the self-protecting disease in question: but the liability of the School to an epidemic outbreak of that malady bears an intimate relationship to the proportion of susceptible individuals—the relative volume of explosive material—present in its midst, at the time when infection is introduced. Dr. George Turner some years ago established this fact in relation to outbreaks of scarlatina amongst the general community. With the more definite conditions present in large boarding schools, we are able to reduce similar facts as regards some common illnesses to a mathematical formula. We can say with confidence, for instance, that in a school of a certain size, whose pupils enter it at a certain average age, there will be an outbreak of Measles or of Rubella, as the case may be, when the number of pupils unprotected by a previous attack of one or the other disease, reaches a certain known proportion of the whole school: and, if the epidemic begin early in the term, so as to give the malady full time for its work, we can predict, with a very close approach to accuracy, the total number of cases: and, further, —knowing the yearly rate at which the unprotected pupils enter the school—we can forecast the date at which the next epidemic will be due.

Now, facts such as these are highly suggestive in other directions: a child already protected by a previous attack, of measles let us say, has had his body so altered that the measles germ no longer finds in his tissues material suitable for its life and development. The altered constitution of those living tissues must also mean a corresponding alteration in the constitution of those tissues when dead and being got rid of. May we not therefore assume that the excretions of such a protected child—the exhalations from his lungs and skin, for example—also differ in this respect from those exhaled

by another child who is still susceptible to the same malady? Consider, then, in this light, the contrasting conditions presented by two separate rooms—one of them occupied by children all susceptible to measles, the other filled by individuals who have already had the malady. Will not the atmosphere of the first room—warm, moist, and charged with organic matter favourable to the development of the measles germ—form a 'culture medium' most admirably adapted to the growth of that *contagium* (should it be introduced), and to its development of increased virulence; as contrasted with the unfavourable soil provided by the air of the other room, which contains children who have been exhaling from their immune bodies organic matter which is, by its derivation, inimical to the life and growth of that virus?

Herein perhaps lies the explanation of the well-known facts: (1) That overcrowding of susceptible individuals not only favours the occurrence of epidemic disease, but in proportion to its degree tends to impart to the disease a more virulent type: (2) That in proportion as the number of susceptible individuals in a school is relatively increased, do we provide the conditions —personal and atmospheric—which are necessarily antecedent to the occurrence of an epidemic;—much as an outbreak of fire in a building would be rendered probable in proportion as it became filled with flimsy and combustible material capable of exhaling inflammable vapour; and (3) That even in schools loaded, as it were, with pupils unprotected by previous attacks of infectious disease, a single case of such illness may be rare, and an epidemic practically unknown, *if* its several buildings are detached and all of them flushed to the fullest possible extent by that most efficient germicidal combination, Sunshine and Fresh Air.

This last is not a merely theoretical assumption. For several years I had an intimate acquaintance with the daily life of a large school in which, during the forty odd years of its existence, there has not occurred a single epidemic of any one of the infectious maladies common to early life. On two separate occasions in three years a single case of scarlatina occurred: such methods of isolation as were adopted we should now regard as absolutely futile: but in neither instance did the disease extend beyond the initial case. For several months the native population of the neighbouring city were dying of a virulent type of measles at a rate which raised the death-rate of the whole city to over 60 per 1,000 for weeks together. But, although communication was wholly free and unrestricted, and the school comprised a considerable proportion of day-boys, not one case of measles appeared

amongst the school community. To my mind, the only adequate explanation of this remarkable immunity is to be found in the conditions under which every member of the school lived, in that:—the school buildings consisted of small detached blocks, none of more than two floors, scattered over some fifteen acres of dry sandy soil: across the narrow isthmus on which they stood, "a broad and equal blowing wind" swept day and night from the Atlantic to the Indian Ocean, tempered by belts of odoriferous pine trees; a sub-tropical sun shone from a clear high sky; and each dormitory was situated over a room which was not occupied during the later hours of the day, so that the air breathed by the sleepers was never vitiated by a pre-breathed atmosphere mixed with the products of combustion making its way up through ceiling and floor from heated rooms beneath.

For the elucidation of these and kindred problems—all of them as intimately related to a complete system of Public Health as they are to purely Preventive Medicine—we are, I think, only just beginning to utilize the rich mine of facts which our schools can yield to those who will spend the time and trouble needed for their collation. It is not easy to set a limit to the results which may be achieved by the careful comparison of a large number of full and accurate returns—each the work of a skilled observer engaged in noting the sequence of events in a large number of individuals, who are—in any one group of schools—drawn from practically the same social class in life, and live under practically identical conditions.

But the conditions which obtain in the school community add a special interest and an exceptional importance to every one of those questions which fall fairly within the province of the sanitarian; and for the same reason they must command constant consideration by the school doctor. Such questions as those of adequate house-accommodation, sewage disposal, and drainage; the proper supply of fresh air, and of pure water, milk, and food generally; exercise—its character, its amount, and its relation to meal times; warmth, lighting, and ventilation; these are of importance to us all and always. How much more important, when we are dealing with the young—who are so much more susceptible, and on whom neglect and mistakes entail evils so much more serious than in the case of the adult! —the boys and girls of to-day, of whom, during their school years, will be made or marred the men and women of the immediate future—the heirs to an empire which they will regard as a burden to be shirked, an inheritance to be squandered, or a life-long honour to be cherished or developed, just as their school life has trained and treated them! For true education

surely means the development—the "drawing out"—and the improvement of all that is best and most capable in the dual entity of man; the culture and the training, not of intellect alone or of body merely, but of both; and that so correlated that each and both shall be jointly capable of the highest and most effective service to the individual, and therefore to the race, and so to the whole world at large. And if, as the late Sir George Humphry once gravely put it, "Learned feebleness is more dangerous than ignorant strength"*—a dictum which I for one am prepared to endorse—how responsible is the position of the medical officer of the school in these days of keen competition in the international brain race; seeing that with him rests, or should rest, the ultimate appeal on those far-reaching questions as to the permissible hours for intellectual work, for sleep, and for play; the kind, the quantity, and the times of food; and the thousand and one associated questions which are continually demanding precise and individual answers in relation to the school-child's welfare! How great his obligations to those other members of his own and its kindred professions whose special work in the great domain of school hygiene help to resolve for him perplexities which would be otherwise insoluble. And, let us in loyal gratitude admit, how great his indebtedness to those wise educationalists of both sexes who make the aim of their profession not merely the acquisition of knowledge, but the training of men and women worthy of the name!

And here I would advert to a matter which presents cause for anxiety, although it is apt to be ignored because it does not appear upon the immediate surface of things. While people are roused by allegations of an epidemic of overwork in board schools, and by a prognosis of national myopia, while their sympathies are harrowed by reports of the break-down of pupil teachers and the suicide of sensitive scholars in national and elementary schools, there seems to be some risk of overlooking the dangers—not less real or less painful of their kind—which attend the members of our public and of many private and preparatory schools. That general attention has not hitherto been drawn in this direction may be due in some measure at least to the fact that the life and trials of the public school boy do not ordinarily come within the ken of the vigilant district visitor, or afford a theme of discourse to an energetic school board candidate; while it is also too generally assumed that the children of the upper classes are, by virtue of their social position, beyond the incidence of those special causes which are

* Rede Lecture, 1884.

known to be operative in the ranks beneath them. The idea is both fallacious and misleading; fallacious, because it ignores the universality of that high pressure and goading competition to which most evils of the modern educational system are attributable, misleading, because it implies that there are no perils attendant on the methods of instruction pursued in public and in high-class private schools. The facts are quite otherwise. If intellect-driving is an irksome novelty to children recruited from slums and gutters, its effects are as evil, and are probably more keenly appreciated, amongst the children of the upper and middle classes. The conscientious son of a professional man who has a position to maintain with a large family and a limited and possibly precarious income, will acutely realise the necessity for early securing a good start in life, for the sake of his parents and of his brothers and sisters no less than for his own. By both friends and relatives he is continuously urged to make the most of his opportunities, and the precept is enforced by reference to examples of brilliant success amongst his fellows; while he is given to understand that he is expected to achieve results proportionate to the special advantages which are supposed to be attached to the favourable circumstances of his birth and social position. And thus, while an extra turn is given to the educational screw, the additional burden of personal worry is brought to bear upon a mind which is, not rarely, unduly sensitive. Moreover, the conditions under which such lads have to work are not by any means so generally favourable as many people are willing to believe. Most fathers will admit that now-a-days their sons are expected to master subjects of a variety, a nature, and an extent to which, in their own boyhood, they were almost strangers. A generation or two since, moreover, when the average standard of school work was considerably lower than is the case at present, the brilliant and clever worker came to the front *proprio motu*—because he could, from sheer natural and spontaneous ability, outpace the crowd; and not because he was forced by a combination of all possible *stimuli* into a precocious and unnatural development. Now, the tendency is rather to work all intellects up to the same standard, to use the conspicuous successes of the few as incentives to further efforts on the part of the less gifted majority, and to fasten upon all the haunting worry of continuous competition. It may well be doubted whether, had he been exposed to influences such as these, Newton would on the one hand have been regarded as a dunce up to the age of eighteen, or, on the other, would have developed into that intellectual giant which the world recognised in his ripened manhood. The forced acorn grows rapidly into a tree sappy as the

willow, but it makes no heartwood, and speedily decays; and no system of cultivation will convert a poplar into a yew.

There is yet another point intimately related to this question. Whilst, in the course of a generation, the standard of education has been so markedly raised, and the amount of work to be got out of, and of facts to be got into, each boy has been proportionately increased; the arrangements for feeding the body have, in many of the larger and older schools at all events, undergone but little modification. The breakfast, dinner, and tea actually provided in our best known public schools, however well they may have sufficed for the necessities of the easily worked scholar of some generations since, are now in many cases notoriously inadequate for the requirements of his modern representative. The intellectual work is more extended, bodily exercise is carried to an extreme, and at the same time the mental faculties are being worked at the highest pressure obtainable, upon a school-fare which would barely suffice to make good the merely physical waste and repair of the growing lad of sixteen or seventeen. So unquestioned is this fact, that in these schools there obtains a regular system whereby, by special arrangement with his parents, each boy is at liberty to supplement the actual school provision by additional food up to a certain value. The result is what might be expected when the selection of this additional ration is left to a youth whose appetite is too often both baulked and jaded by the combined paucity and monotony of the fare regularly provided. And probably no one whose experience has not lain amongst the juvenile consumers of the viands thus selected can fully appreciate the mischief which may be fairly laid to the charge of this system.

Protest as he may against the prime causes at work in such cases, the school doctor cannot hope to effect their immediate abrogation. All the greater is the need for securing, if possible, that children, who it seems must run the risk of being overworked, shall at least be made to carry on that work under the best hygienic conditions, and on a dietary sufficient in amount and duly varied in kind.

Although the remarks hitherto made have referred more especially to boys' schools, it is not thence to be inferred that there is no room for improvement in the hygienic management of those establishments which are devoted to the education of the opposite sex: or that the material which is there available will not amply repay observation and record. But in an age in which the equality of the sexes is preached from the housetops it is fair to expect that anything which is recommended or condemned in the school system to which boys are subjected wi

come to be rgarded with no less praise or blame in the case of girls, and that it calls for remedial action equally prompt and energetic in both cases.

And now, though here I may be trenching upon the subject of one of those papers to which we are looking forward, I would ask is there not one serious hiatus in the ordinary school curriculum? How is it that in our great public schools the one thing of which the pupil is systematically taught nothing, is the care of his own body and the relationship in which he, personally, stands to what are called the laws of health? No one would more strongly deprecate than I the manufacture of schoolboy faddists; and there is no person more harmful in his way than the sanitary prig. The best kind of health is unconscious health. Yet, even where ignorance is bliss, wisdom is not of necessity folly. And in a state of civilization so complex as our own, attended by dangers so many and often so insidious, some knowledge of the perils which will certainly beset his path through life is not only serviceable to the individual, but serves to make him, both directly and indirectly, more helpful to his fellows. While the mere fashion of sanitary details may vary with the development of social life and the progress of human ingenuity, the broad-based facts of hygiene are unchangeable so long as humanity endures. No boy or girl would be the worse for acquiring, before leaving school, an elementary knowledge of what makes for health in the house, in the village, and the town, and in their own persons. To me it appears anomalous that, while instruction in the elements of hygiene is recognised in Board Schools, and when lectures on the subject are to be delivered to the convicts in our prisons, the future legislator and landowner, the great employer of labour, the mistress of a household, should be deliberately trained in an ignorance which may easily make all the difference between their becoming dangerous or useful members of society.

We may, perhaps, differ with regard to some of the points on which I have briefly touched; but this at least, ladies and gentlemen, I am sure that we shall admit; that with regard to the various details of life at school, some of which I have specifically named, there may still be noted a variation in management and method far greater than can be necessitated merely by the inherent variability of the *genus puer;* and these, therefore, are subjects which may fairly be deemed worthy of discussion and adjustment. The hygiene of the school, indeed, is a field so wide, so interesting, and in every way so important, that it cannot fail to furnish material for consideration at each of the many conferences which will, I trust, succeed that which we are now assembled here to open.

CONFERENCE OF ENGINEERS AND SURVEYORS TO COUNTY AND OTHER SANITARY AUTHORITIES.

ADDRESS

By E. Purnell Hooley, Assoc.M.Inst.C.E.

PRESIDENT OF THE CONFERENCE.

(Member.)

Having accepted the honour offered me by the Sanitary Institute of presiding over your Section of this Congress, I have the greatest pleasure in welcoming you to this charming, historic, and beautiful town. I most sincerely hope that your visit here will add a few happy hours to your busy lives, and that the mutual intercourse, and opinions expressed, will be of interest and value not only to ourselves, but those who employ us.

I have had very considerable difficulty in choosing for my address a theme that has not already been well worn and more ably discoursed upon than any with which I am able to entertain you, but the very fact of my having found this difficulty has in itself given me a text. I therefore propose with your indulgence to say a few words on the subject of "Some of the difficulties of Public Life, especially in regard to the position of a Surveyor under one or other of the present Councils."

The youth entering the office of an Engineer fresh from school, too often dreams of, and looks forward to, a grand free and easy, happy-go-lucky, do-as-you-please life, with little or no cares or worries, a fairly decent salary, and a life appointment. How rudely are his dreams and fancies shaken, if he from the first takes any interest in his work. How quickly he finds out how many eager, struggling men he has to compete with, how he must work and strive if he wishes to place his foot on the proverbial bottom rung of the ladder, and even then what anxious worrying moments he has in store before he feels he has commenced his career. Think back awhile! Is there a man in this room who could look back

and feel comfortable even now in thinking of the dreary waiting time, before he was "earning anything"? How devoutedly have we all wished we had learned more during our pupilage or secured the interest of Mr. Blank, who could have helped us just now when we most wanted help. Then carry your mind to the anxious time when "selected" for an appointment where "canvassing is prohibited"; you are one of seven "selected," and going through the weary wait outside the Committee Room, feeling and finding out your chances of success are lessening every time you speak to anyone, though possibly happy in the thought you have honourably obeyed instructions and not canvassed, whilst you hear on all sides that a local man, the son of a builder, a broken down farmer, or even a member of the Council, is also "selected," and has not so honourably obeyed instructions. But these are only early difficulties, and as time goes on, one looks back and smiles at the thought of how our best hopes were then dashed to the ground by being informed by the Clerk of the Council, with a pitiful look of commiseration on his face, that he is "sorry to inform you, gentlemen, none of you are elected, but Mr. Jones (the local builder and ex-member of the Council, lately retired) is elected. If you will let me have a note of your third class fare (no, we cannot allow cabs!), the amount shall be forwarded to you after the next meeting in a month's time." But I am thankful to think this, which was a very common result twenty years ago, is but seldom met with nowadays, and the greatest difficulty that arises from the foregoing position is the difficulty of finding a man, a very few years after, able and willing for the small pittance often offered, to undertake the work of undoing all that the then elected man has blundered into, either through lack of knowledge, or the bullying of those "friends" who elected him to an office he was totally unfitted for, a few years before, and now consigned by them to an early grave or the workhouse, because at last he had ventured to point out that, which even he had been able to see was rascally wrong, and so provoked their ire. Look back again, any of you who can remember those early days when you appeared before a Board and finally upset the arrangement of Mr. Builder's election, by being appointed by a bare majority of men who felt you were the man, who should be appointed, in spite of all outside pressure and local interests, then ponder for a moment over the feeling that makes you blush for your manhood now when you think of what you had to put up with from certain members of that minority. Happily, the writer's lot has been differently situated, but in no position better than a County Surveyor, in touch with Urban men, can this intolerable

position be better known or more sincerely commiserated with. But let us pass these difficulties and turn to the difficulties met with when holding an appointment supposed to be of a remunerative character. How seldom dares one act with the independence one feels entitled to act, to be honest and true to one's own better nature. How often one's best motives are misconstrued or misunderstood, and very often, after having acted to the very best of one's ability, does that "friend to all" the Local Press, commence its pleasing duties of pointing out —in large type—that "reckless extravagance and needless waste has been exercised, instead of the economy preached at the preceding election by our candidate." Then come the minor stings of the anonymous correspondent, and the final heckling by the goaded Councillor who happens to know nothing of the matter complained of, but being returned by his fellow workingman, thinks it his right to ask Mr. Surveyor a few personal, and bordering on excessively rude questions, he is pleased to think his outside friends will appreciate, when they read their half-penny paper; the said paper heading its columns with large letters of a peculiarly irritating type. With this, as a minor experience of a minor Council, an official is supposed to mildly submit to as part of the reward of a salary a few shillings per week better than his road foreman, and feel it is only "Mr. Jones doing his duty to the ratepayers;" and if you complain to any kindly member of your Council, you are told not to be too thin skinned, no harm is meant. To the established young Surveyor such troubles sit lightly, but to a young man with fine feelings the position may be intolerable.

Again, the laws of our land wisely prevent any individual being a member of a Council and thereby interested in any contract being undertaken by him with this Council. There are contracts and contracts, but I know of no worse contract than that made by a man having been corrected, or made to carry out that which has been against his wishes or pocket, afterwards being allowed to take a seat on a Council, having previously openly stated that he has obtained his seat for the sole purpose of venting his spleen and endeavouring to upset the official— who has possibly been the innocent cause of his trouble, and by obtaining his removal, gets his desired end and saves his individual pocket by either worrying the official into resigning, or gathering sufficient force around him to obtain his dismissal on quite another ground of complaint, everyone else being quite aware of the real cause of this action.

The difficulties of early careers can only be too well remembered by most of us, and those who have sailed on the troubled sea, can but warmly feel for those now passing over the unplea-

sant waters, but when passed, the haven of rest is not quite reached, for public life as understood in connection with Local Government, is never a bed of roses. Troubles are constant, and lucky is the man who can steer through the greater, if he does not fall or fail through the minor ones.

The author will not travel further through the long vista of an average career, but content himself with a few remarks on an average income in payment of these services that are expected to be so cheerfully and uncomplainingly rendered by, at any rate, the Surveyor.

The majority of salaries on which a man is supposed to live, clothe and keep himself honest, is £150 per annum, and lucky is the man who finds he is able to keep single until his prospects are more settled. After a few years of waiting, whilst possibly his district has doubled itself in size, and he has worked as he probably never will again, his salary is grumblingly increased to £200 per year. He then sees a prospect of a home, a wife, and happier surroundings; at thirty-five he may be in receipt of £350 per annum, but still his position compels him to keep his head as high as possible, and his conduct so straight, that he, to be above suspicion, must spend almost every shilling of his earnings, and thus has no possible chance of saving for a rainy day, for those who are now dependent upon him. But there is such a risk, and few who have not considered the question seem to realize it, and the author's opinion certainly favours it, that the early worry, the anxious and everlasting strain that a young man has to go through, too often weakens his constitution, and makes him unfitted to sustain a severe illness, and this is the cause of the very many early collapses our Association of Municipal and County Engineers has to record.

With these thoughts of the future, think what a grateful country does in return; it excludes us from the benefits of superannuation, and has no means of helping our wives or children, if we have been unable to do anything ourselves for them. The author can only urge all his hearers to strive onwards to the goal of all public service, viz., superannuation, and whilst this is being striven for, he would warmly recommend and earnestly beg all those who can to help each other by doing their utmost to assist the efforts that are now being made to help the widows and orphans of those who have left us, without having been able to do anything for those who are left behind. The thoughts of leaving that little family unprovided for may only too possibly have been the cause of a terrible death-wrench when the horrors of the future have been vividly brought forward. This "difficulty" has already been ably dealt with quite

lately, and will be keenly in the mind of most hearers of the address of the President of the Association of Municipal and County Engineers.

The author, as a remedy to all these woes, can only suggest that the Local Government Board should accept the Surveyor on the same footing as the Medical Officer of Health and Inspector of Nuisances, and so at any rate prevent his being dismissed at the caprice of those over him without any court of appeal, and then with superannuation in front and security of office at hand his lot would be happier, his worries less pungent, and his mind freer to combat with his daily duties and professional worries.

The difficulties dealt with have been those of a melancholy nature, and my hearers, I fear, will vote I am guilty of bringing the doleful side of life before them. No one can look back to a happier and brighter career than does the author of this address to-day, but the difficulty of being in too comfortable a position is one almost as embarrassing as that of the uncomfortable one already touched upon, and to those so happily situated, I would earnestly commend the positions of those not so favourably placed, and beg all to try and do their utmost to help each other, remembering that a little real help is worth endless sympathy. The opportunity of removing a few of the "difficulties" met with in a public career is bound to come to all, and I know of no better opportunity or one more likely to succeed than the mutual help to be met with at this and similar meetings. May the present meeting have the success it deserves, and may the papers read and the mutual advice given, be the means of all here spending a happy and enjoyable time, free from public worries or such like cares, and fit us to return to our duties in a more happy and contented mind.

CONFERENCE OF VETERINARY INSPECTORS.

ADDRESS

By W. Hunting, F.R.C.V.S.

PRESIDENT OF THE CONFERENCE.

Since prevention became generally recognised as of equal importance with the treatment and cure of disease, Congresses for the consideration of sanitary and hygienic matters have been organised on an ever widening basis. Not many years ago, questions of health and disease were left almost entirely to medical men. Now they are discussed by a variety of experts who are capable of presenting new aspects of special questions, and of throwing upon them a wider and more penetrating light. We have medical men, architects, engineers, chemists, statesmen, local authorities, all co-operating for the common good, and bringing to the assistance of each other special knowledge essential to a thorough understanding of the subject, and to the formation of a real protective organisation.

In quite recent times the Veterinarian has been recognised as an expert who possesses knowledge valuable to sanitary science, and the existence of this conference as part of the Southampton Congress is a practical acknowledgment of the fact.

Veterinarians are not, however, content with the mere abstract recognition of their utility by a few leading members of the medical and sanitary world. They desire to be accepted as practical workers and scientific advisers by all the sanitary authorities in the kingdom. They are willing to contribute the knowledge they possess, but desire also to be allowed to superintend the practical application of such knowledge. They are unwilling to supply their technical advice, and then to stand aside, whilst untrained men attempt to carry out regulations based upon it. Such methods discredit the expert by leading to failure—failure which would be averted if the practical application, as well as the initial suggestion, had been left to the trained man.

In 1865 Rinderpest invaded England, and the rapid spread of the disease, with its accompanying fatality, promised to decimate the cattle stock of the country. Veterinarians, led by Professor John Gamgee, urged an organised system of stamping out. All sorts of objections to the plan were made, but ulti-

mately the advice was accepted, and in a few months the plague was exterminated. This success led to the formation of a Government Veterinary Department, and to the passing of the Contagious Diseases (Animals) Act of 1869. Two diseases —pleuro-pneumonia and foot and mouth disease—which cost the country an annual loss of a million sterling, next yielded to the regulations. Two more diseases, both transmissible to man—glanders and rabies—are fast disappearing before the methods advised by veterinary surgeons.

The Indian Government, some years since, instituted a Civil Veterinary Department, which is concerned not only in the prevention of disease, but in superintending the breeding and rearing of stock all over our great dependency.

Hardly a colony exists that has not a veterinary adviser; and the larger self-governing colonies have each a veterinary department. South Africa has just passed through the perils of an invasion of rinderpest, and it has been stated in the Cape Parliament that the action of the Veterinary Department saved 2,000,000 head of cattle to the colony.

All our large companies place the charge of their animals in the hands of a veterinary surgeon and find their economy in so doing.

The great agricultural societies have their staff of technical officers and amongst them always a veterinary surgeon.

These facts go to show that wherever the veterinarian has been entrusted with the care and control of animals in health and disease he has demonstrated his fitness for the work. He possesses knowledge derived from observation and special training which no other class possesses. He is in his own province *facile princeps*. His sphere may be a small one, but it is intimately associated with public health and requires for its mastery as much special and technical knowledge as any other calling.

When we come to the Local Authorities, in whose hands are placed the care of public health and the control of animal diseases a very different state of things is revealed. A few leading Corporations have secured the services of a veterinary officer, but the rule is to call in veterinary skill only after some amateur has failed to deal with a matter beyond his comprehension.

It is curious that collective bodies have not generally recognised the value of a veterinary expert—still more curious because, as a rule, every individual member of these bodies shows in his private capacity a full appreciation of the profession.

All communities have a very direct interest in the animals

forming part of their possessions. These animals contribute a large proportion of the food supply, they yield various products which come into the closest contact with human beings, they suffer from disease which is communicable to their owners, and they are subject to rules and regulations which, wrongly applied, are sources of loss and trouble to the traders concerned. Let me shortly notice the intimate relations of animals to men a little in detail, and I think it can be made clear that our legislators and rulers cannot neglect veterinary experts without sacrificing the best interests of the public.

The diseases of animals transmissable to man are neither few nor unimportant. Rabies affects the dog, and no case of hydrophobia in man has ever arisen save as the result of transmission from a diseased animal. The only way to protect man from this awful disease is to exterminate it among animals. Glanders is a disease of the horse, and every death of a human being is traceable to infection from an animal. Anthrax is a disease of animals, specially seen in cattle and sheep. Every human life lost through this disease is traceable to infection, either from the blood or the hair or wool of a diseased animal. Tuberculosis is a disease affecting all animals, but especially prevalent among cattle. It is generally accepted that not less than 30 per cent. of the milch cows in this kingdom are affected. Two Royal Commissions have reported that the disease may be transmitted from animal to man, and that the meat and milk derived from a tubercular animal are a source of danger. These four diseases of animals are direct dangers to the community, and should be guarded against by rational measures. Who is so fitted by experience and training to advise what should be done, who so able to take action as the veterinarian?

There are other diseases of animals of great importance to the well-being of man. There are parasitic diseases affecting animals which may pass to the human subject. The flesh of the diseased pig may carry trichinœ to man. Various skin diseases such as ringworm and some forms due to animal parasites are communicable to man. Some maladies, such as cow-pox, may possess special value, but it is important to know that they are pure and uncontaminated by any other virus due the existence of additional disease in the animal.

In all large communities where animals and men are brought into contact there is a danger to public health by the passage of disease from one to the other. The cure or treatment of the infected man may well be left to the medical man, but the prevention of infection cannot be attained save by the co-operation of the veterinarian.

The living animal is a possible source of danger, so also are the food products yielded during life or after death. Meat and milk must be free from disease. The recognition of disease in animals either dead or alive is specially the work of a veterinary surgeon. No other person can be trusted to detect it and to estimate its importance so correctly as the veterinarian. The inspection of horses, cows, sheep and other living animals—unless it be a sham and a fraud—can only be conducted by qualified veterinary surgeons. The inspection of dead animals is also within the province of the veterinarian. No medical officer of health—certainly no sanitary inspector—can recognise the conditions presented by carcases prepared for food with the same certainty as a veterinarian.

In every large town there are animals capable of infecting human beings with fatal disease, there is food in the form of meat and milk which should be derived only from sound animals, there are hides, and hair and wool which may convey disease, all these require that the Local Authority should have the guidance and assistance of a veterinary expert.

There is another point too which must not be overlooked. The law provides restrictions on the movement of diseased animals, it imposes penalties on men guilty of offences against public health. Very important is it to all Britons that no injustice be done to the individual. Erroneous opinions may and have led to gross injustice. Men in authority should know their business, and the existence of a veterinary expert on the staff of Councils and Corporations would be a safeguard against waste and injustice.

Some years ago, the error of a Medical Inspector who traced an outbreak of scarlet fever to some imaginary disease of cows on a dairy farm at Hendon, led to great injustice. The milk supply was stopped and the cowkeeper nearly ruined. Veterinary co-operation would have prevented this waste of milk and hardship to a tradesman—conditions which may recur any day. Not only the cowkeeper and dairyman is a sufferer from want of efficient inspection. The butcher has suffered untold injustice in some towns from seizure of carcases supposed unfit for food. Half-trained Inspectors have confiscated carcases of beef, because some one or two tubercular nodules have been found in a single internal organ. Only recently a carcase was seized under the supposition that it was infected with tuberculosis, but which was found to have nothing wrong, save the results of a little local pleurisy.

In other directions also much harm has been done by untrained men acting upon the theories of others equally destitute of practical knowledge. Gross exaggeration as to the necessities

of air-space and ventilation in cow-sheds has been the rule. Regulations have been based upon theories and drawn up by men practically unacquainted with the subject. Committees venture to act upon the suggestion of clerks and policemen in reference to animals, as though a knowledge of animal life and disease was something that everyone possessed a natural and intuitive knowledge of. If common humanity is not sufficient guide, one might imagine that business men would consider the rights of the owners of animals, and employ an expert before taking action which might injure animals or their owners.

Sound pathology must be the foundation for preventive medicine. The study of disease in man is partial and incomplete unless accompanied by the study of disease in animals. Probably more light has been thrown upon pathology during the last thirty years by researches made upon animals, than in any previous sixty years when disease was studied in human beings only. The science of pathology can only progress by wider and more extended research on all diseased processes in all kinds of animals; medical observers must co-operate with veterinary, and no opportunities should be lost for combined study. The prevention of disease cannot be confined to one set of workers, and authorities, who have to frame regulations for the protection of the public, may limit or expand the opportunities for medical and veterinary co-operation.

Of the value of joint effort I need not give many illustrations. One will be enough. Until quite recently the spread of tuberculosis in man had been credited more to heredity than to contagion, with the result that preventive measures were misdirected and wasted. Very few men now accept heredity as a cause, and the change of view is due solely to the work of a veterinarian. Bang, of Copenhagen, by his experiments and observations has demonstrated that heredity as a cause of transmission of tuberculosis may be ignored, and his results have revolutionised the methods of prevention. Without Bang's work the prevention of tuberculosis would have continued on erroneous lines and human health have suffered accordingly.

The latest of Public Health Acts—that of Scotland—recognises the veterinary surgeon as an essential officer in the examination of living animals and, to a less extent, in the inspection of carcases. When Parliament amends and consolidates the chaotic Public Health Acts it may be hoped that the veterinarian will be more fully recognised.

Meantime Local Authorities may do more than is now done to protect human beings from the dangers of disease among animals, and to protect the owners of animals against injustice resulting from ignorance. The examination of animals requires

knowledge of a kind not possessed by medical officers or by sanitary inspectors, and yet in many districts such work is performed by men incapable of the task.

There may be administrative difficulties in the employment of veterinarians, but none which cannot be surmounted when the advantage to the public is fully recognised. Work which the V.S. ought to do is now shared between medical and sanitary officers. There is no place vacant for the V.S., and the necessity for his appointment is not appreciated. Even when local authorities have a veterinary surgeon available under the Diseases of Animals Act they do not utilise him under the Public Health Act. The very fact that he is attached to one committee of a local authority seems to render him obnoxious to another committee. The Cattle Diseases Committee and the Health Committee require two separate veterinarians to assist or advise them. What would be thought of two committees of one authority who employed different architects or engineers?

If my statements are true and my conclusions correct I claim to have established the necessity of co-operation between veterinarians and medical men for the protection of public health. Every local authority has now a veterinary inspector under the provisions of the Diseases of Animals Act. Nearly all local authorities are owners of animals and therefore, at times, in need of veterinary assistance.

In the interests then of public health and of public economy I assert that no local authority does its duty by the ratepayers that has not appointed a veterinary officer to whom application can always be made for assistance and guidance in the multiform duties requiring expert knowledge of animals.

In some way or other such knowledge is obtained. In some districts one veterinary surgeon attends the Corporation horses, another looks after the sewage farm, whilst a third is inspector under the Diseases of Animals Act. In one large town a veterinary surgeon is meat inspector at the abattoirs, whilst another veterinary expert looks after the rabid dogs and glandered horses. In a few counties a veterinary officer is consulted by the Council as to the measures they should enforce to prevent disease in animals. In others he is never asked for an opinion, but only for a diagnosis of such cases as occur. All is muddle and confusion. London is perhaps pre-eminent for its veterinary arrangements. There is a Cattle Diseases Committee of the County Council, not one member of which has any practical knowledge of animal diseases, and it has never consulted a M.R.C.V.S. since it was formed.

CONFERENCE OF SANITARY INSPECTORS.

ADDRESS

By C. MacMahon, Chief Sanitary Inspector, Torquay.

PRESIDENT OF THE CONFERENCE.

Deeply sensible as I am, of the honour done me by the Sanitary Institute, in asking me to preside over this Conference of the Sanitary Inspectors of the Kingdom, and grateful as I feel for the cordial support which you, my confreres, are extending to me, I cannot but be diffident in addressing a body of experienced men, upon whom rests so largely, the operation, and the execution of the sanitary laws of the realm. I understand it is not necessary for one holding this position to give anything in the nature of a paper, upon a set subject, as discussion is precluded, but if I were to bestow a specific title on the matter upon which I deem a few words, at this juncture, desirable, I would adopt the title of "Hindrances to Sanitary Efficiency."

Now, Gentlemen, it cannot be asserted that we have attained the maximum of executive efficiency in carrying out the Statutes and the Bye-laws throughout the Kingdom, for, so long as some men exercise their functions in a spirit of timidity and half-heartedness, by reason of the very conditions and surroundings of their position, so long will the country at large suffer from its sanitary weapons being blunted, and the want of courage to use them, by the officers commissioned to fight against disease and death.

The first hindrance or obstacle in the path of efficiency is, undoubtedly, insecurity of tenure of the offices held by the Sanitary Inspectors. What do we find? that in the main they are appointed from year to year. Some few enlightened authorities have extended the period to three or five years, and a very few, the merest exceptions, have made their officers permanent.

Now, how is it possible for an Inspector, often a stranger to his district, to carry out his various and disagreeable duties to the highest point of efficiency, when he knows that by the time

his re-appointment comes on, he may be outvoted by some of the members of his authority for interference with their property or interests? This is no mere fancy, cases could be cited where (though this reason of course, was not given), the effect was the same, the Officer was left in the lurch.

I know one well-known case in the Midlands where a perfectly competent and long experienced officer was so left, because there had been a division of his large rural district, owing to the operation of the County Councils Act. The new bodies did not agree as to the Inspector who had faithfully served for a dozen years. I may observe that I myself was a selected candidate for this very appointment some sixteen years ago, and I cannot be sufficiently thankful that I escaped being placed in my friend's ultimate predicament.

But some of the public will say surely there is an appeal to the Local Government Board. Well, gentlemen, we know there is some kind of a weak reference to that august body, but what is the result? Simply, as stated some years ago by one of the ablest Parliamentary Secretaries who ever occupied the position (Sir Walter Foster), that nothing could be done in the case in question, as there was no legal power; but that in future a recommendation—*not* an order, mind—would be made to Local Authorities to extend the periods on the re-appointment of officers. This has been done in several cases, as before stated; and this partially successful concession is one of the benefits which have been obtained by the combined action of the Council of the Sanitary Inspectors' Association and influential friends of that body, who secured interviews at the Local Government Board. There are other cases where an officer's position has been untenable because he was too zealous in endeavouring to secure a high standard of efficiency, and thus gave offence to some who had the power to support him or otherwise. One of the cases is quite recent, and I know as a fact that the Sanitary Authority in question has lost the services of one of the most able men in our profession. This district will undoubtedly suffer by the retirement, voluntarily, of an officer, who found his duty hindered at every turn, and therefore would no longer be responsible for the work of the district.

Far it be from me, to put forward that all of us are deterred from our duty, or that all governing bodies are so unsatisfactory to work with. Many there are, who cordially support their officer and continue for many years to do so, but the great fact remains that the office itself is insecure by statute, and its holder, however courageous, zealous and competent he may be, has ever the Sword of Damocles, so to speak, hanging

over his head. This should not be, the soldiers of Sanitation should be as secure either for a long period, or for life, as the soldiers of the Empire.

This brings me to the second hindrance to efficiency, viz: the want of superannuation. After a man has spent his life in arduous, dangerous and important public work, most frequently for a totally inadequate remuneration, he must, when getting into years, or incapacitated, resign—this means for very many almost beggary, or the workhouse. What chance has a man with £100 a year salary and a family to bring up, to save for old age? and if by dint of the greatest thrift, he did so, would it suffice to make the vale of his life as it ought to be?

Soldiers, and officers of the peace, civil servants, and many other functionaries, are entitled to retiring allowances, on completion of set terms of service, why not Sanitary Inspectors? are their duties less arduous, exacting or dangerous? on the contrary are they not more so? Do they not risk their lives, their health, and that of those near and dear to them, by their frequent contact with infectious diseases, and their constant dealing with dangerous sanitary conditions? I assert here, boldly, that the soldier on the field of battle, does not incur more actual danger than the ordinary Sanitary Inspector in one of our busy, thickly populated towns.

I know a case of a dear friend of mine (now at rest) who had charge of a district in the Midlands, where some years ago, that dreadful scourge, small-pox, raged. It was so bad, that scarcely anyone could be got to assist in burying the dead, and on several occasions my friend had to give aid to such as could be got to carry them to the grave. He contracted the disease, suffered badly from it, and when recovered, though he received a handsome gratuity for his extra, and really noble services, he had no heart to continue to run such risks, especially, as he told me, there was nothing to look forward to—he resigned on obtaining an appointment in Liverpool of a different character, and where superannuation prevails.

Yes, gentlemen, this prospect of a retiring allowance must remove many anxious thoughts; and will be a great incentive to efficient and thorough execution of our duty. How have we been met in this matter? Again our excellent Association, recognising the merits of this claim, has put forth superhuman efforts to secure the boon. We have striven to obtain the assistance of men in high places—Peers and Privy Councillors, Members of Parliament, and great names in the sanitary world—but, so far, nothing has been done with our Bill to provide Superannuation; it is shelved, as it was last year, and we are told to co-operate with other officials of governing bodies, and try

again. This, of course, we shall do; but if our claim is in itself good, desirable, and really deserved, I hold that it should have gone forward as the worthy pioneer of similar measures for other but distinct officials of Local Authorities.

It would really appear as if the remedy for the hindrances mentioned lies in all Sanitary Officers being constituted Government Officials, and responsible to a new Department of State, with a Cabinet Minister at its head—the said Minister to be liable to questions in Parliament as to the state of every sanitary district in the kingdom, and of the administration thereof.

At present, the Local Government Board deals with matters of this kind in camera, and in a kind of way not generally satisfactory, and seldom goes out of its routine methods, either in listening to the claims of an officer when in conflict with his Authority, or coolly asks him if he is willing that the correspondence should be laid before his Council for their observations.

The appeal is simply useless. Again, there is another hindrance to efficiency in the matter of the appointment of an officer: often some local favorite, of insufficient qualifications and little experience is chosen, as against others of undoubted capacity. The Board above, usually sanctions such appointments. For some time, surely, and until the new officer acquires a proper knowledge of his duties, sanitary efficiency in that district must suffer. I submit that as the Local Government Board in approving of such appointments, allows half the salary to be refunded from Parliamentary moneys, they should have greater power in the choice. A way might be found thus: The local authority usually chooses 3, 6 or 10 from the number of applicants from whom to make the final choice. Let such authority submit three names and label them 1, 2 and 3 in their judgment of merit, together with their credentials, to the Local Government Board. The Board could then impartially weigh the respective merits, and award the appointment, I believe in a manner more calculated to secure a thoroughly competent and disinterested inspector than obtains at present.

In conclusion, I submit, that if tenure of office and superannuation can be obtained within a reasonable time by Act o' Parliament, the need for drastic change as indicated may pas away; but without these privileges, I was going to say right: conceded, my opening contention that there are grievous hind rances to sanitary efficiency in this country holds good, and mu: remain more or less a public scandal.

Our Congresses and Conferences, and the loud-beating of th sanitary drum throughout the land, have awakened an immens amount of interest in all questions affecting public health, an

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have enlisted some of the brightest brains and the best hearts in the country in its service. These meetings are productive of vast good from the knowledge disseminated, and the interchange of ideas of co-labourers in the great field of sanitary work.

But, if *salus populi suprema est lex* is anything more than a sonorous aphorism, and has any real and sound application, then something more is needed, and is due, from the great Court of Parliament to remove all blocks and hindrances which beset the way of those who are charged with so onerous and precious a burthen; none other or less than that of preserving so far as in us lies, the health of the young, the middle-aged, and the old of this great nation, and its sturdy race, whose sons have made their name and their fame ring in the annals of the world.

CONFERENCE ON DOMESTIC HYGIENE.

ADDRESS

By Mrs. C. R. Patey.

PRESIDENT OF THE CONFERENCE.

My duty and privilege is to offer a welcome to the women members of this Congress to Southampton. I do so with much pleasure, feeling sure that the natural beauties of the neighbourhood, combined with the hospitality of the inhabitants, can only result in a very pleasant meeting, and let us hope, in no little good to the community at large.

It would be difficult to find a more attractive centre than the town in which we are assembled. Besides the many interesting, and in some instances unique, architectural and antiquarian remains to be seen in Southampton itself, we are within easy reach of Winchester, the ancient capital of England, with its Cathedral, School, and mediæval walls and gateways, and associated closely with the memory of Alfred the Great. There is Romsey, too, with its Abbey, unrivalled as a specimen of beautiful and massive Norman architecture; and on the other side of us, and in contrast to these towns, with their old world memories, lies Portsmouth, the largest and most important dockyard in the world, where may be seen the most magnificent specimens of the modern battleship, armed with the latest and most scientific weapons of offence and defence. An hour's sea trip brings you to the Isle of Wight, often spoken of as the Garden of England, and a short run by train or bicycle will carry you to some of the most beautiful spots of the New Forest. We who live in this district gladly welcome you who are visitors here, and trust that you will derive no little healthful enjoyment, as well as mental invigoration, during your stay.

This is the eighteenth Congress of the Sanitary Institute. From the numbers attending, the wide range of subjects on which papers are to be read, and the interest shown in them by those who have expressed a desire to join in their discussion, it bids fair in no way to fall behind its seventeen predecessors.

Undoubtedly there is a deepening interest taken in matters which affect the health of the people.

Until comparatively lately that interest was chiefly, if not entirely, a professional and technical one. The very first principles of sanitation were known only to the few, as compared with the many who now make a study of them, and

show a desire to increase their knowledge and understanding in such matters.

The Sanitary Institute has done invaluable service in spreading a knowledge of the principles of hygiene, and we owe it a great and growing debt of gratitude on this account.

It is not so very long ago that in selecting a house scant attention was paid to the system of drainage.

People drank their water and milk regardless of their source; and as to where milk and meat were kept and the state of health of the animals which produced them, these were matters of perfect indifference.

If cottages or villages were picturesque, that circumstance covered a multitude of sins: and as to cubic spacing, ventilation, and the disposal of refuse, such things were little thought of.

Now, of course, no house would be passed by the sanitary authority of the district, unless all these matters had received due attention, and were in accordance with local bye-laws drawn up on scientific principles.

Our particular subject to-day is domestic hygiene—health in the home.

If, as we all admit, home-life is so immensely influential in its bearing on the training of the mind and the formation of character, surely it is no less important on its physical side—the health of the body.

There is first of all the obvious point that all members of the home should be brought up amongst wholesome surroundings, such as are favourable to the development of a sound and healthy physical frame.

And there is also the point to which we are, perhaps, inclined to give less consideration, the necessity for inculcating in the young some general knowledge of the laws which govern health, and the danger of tampering with them, and the serious responsibility which lies on each individual, both on his or her own account, and for the sake of the community.

All this you may say, now-a-days, goes without saying. We can hardly take up a paper or magazine without finding an article on hygiene or its kindred subjects, and much of the time (and a good deal of the temper!) of local governing bodies, are expended in discussing sanitary matters.

And yet, with all our progress, is there not too great a tendency, even now, to leave the responsibility too much to a paternal Government, whether local or central, and to shirk our individual responsibility in the matter?

May we not hope that the proceedings of this Congress will help to bring the subject home to many, who would not otherwise be disposed to give much thought to it.

Among the papers to be read is one on the *Practical teaching of Hygiene in Schools.* My own experience leads me to think that in *secondary* schools the teaching is somewhat too narrow, being chiefly confined to physiology, and the treatment of the body. If, in such schools, the curriculum could be widened so as to include some simple lessons on the sanitation of the home, the instruction would be of much more practical value.

I am glad to be able to tell you that the School Board for London has lately taken decided steps in advance, in the direction of teaching elementary hygiene, under the name of domestic economy. I have here its syllabus of instruction: (combined cookery, housewifery and laundry,) which includes such lessons as home-nursing, warmth and light, ventilation, fresh air, cleansing cisterns, waste pipes, composition of dust, etc. The course extends over three years, and theory and practice go closely hand in hand. By degrees this subject will, it is hoped, be taken up by school authorities throughout the kingdom, so that a large proportion of the children attending elementary schools may reap the benefit of such valuable teaching.

Not that it is the children only who need educating, but the fathers and mothers as well; and here there is a large field open to women workers in hygiene.

If ladies would take this matter up, they would, with the exercise of a little tact, be able to obtain the confidence of the poor, and having once gained this, it would be easy to impart some elementary lessons in hygiene when visiting their homes. Who shall say how many lives might be saved, and how many illnesses averted, by these means?

It would be an excellent thing if a number of ladies in every town would band themselves together, and, having acquired sanitary knowledge, take districts, and teach the poor, not only the elements of cleanliness, but a few elementary principles of feeding their young. Point out to them the methods by which the dangerous infectious diseases may be noticed or suspected, and so enable them to call in medical aid in time to prevent the spread of infection.

The advantages of light and air might be impressed, and some simple method for securing ventilation in bedrooms and other rooms without draughts, such as by placing boards under the lower sash, might be explained, and for a small amount the boards might be provided for those willing to adopt them.

Very few of the poor have any knowledge of cooking whatever, and it could be shown that it is not necessary for food to be expensive to be tempting. Many simple dishes can be made without increasing the present expenditure, and in many homes

the standard of living might be distinctly higher and more satisfactory than that at present attained.

The difficulty in all these matters, we know, is to find a leader, but given that, there are plenty ready to help, both financially and by tuition. By their united efforts much misery and ill-health would surely disappear.

It is a disappointment to many of us, that women, who are acknowledged to have done such admirable work on the London Vestries, are to find no place on the new London Municipalities. But let us hope that this aberration on the part of the legislature is only temporary, and will lead in the end to the recognition of the fact that there is a very distinct sphere of work for women as members of all municipal bodies throughout the kingdom.

We shall probably most of us agree that it would be a good thing if more women could be induced to go on public bodies, with a view to helping on the great crusade of sanitary reform. The *Ladies' Field* for August 12th bears testimony to the value of work already done by Women on Parish Councils.

It says: "There are several instances where a woman serving on the Parish Council is to be credited with the successful achieving of many needful *sanitary* and other improvements. In one village the water supply was so bad, and so insufficient, that the children suffered much from skin eruption. A lady councillor, who had the local interests greatly at heart, alone, and almost unaided, has managed to get a proper supply of pure water. The day this new well was sunk was a gala day in the village, and the lady councillor was elevated to the rank of a heroine."

In conclusion let me just say, that though our time for talk at this Congress is limited, the work before us is absolutely boundless.

The particular line we may each pursue matters little. Time or choice, circumstances or individual taste, will settle that. But if only our object be the increased health and happiness of some few individuals, and through them a wider and ever widening circle, who can tell how vast an influence for good we may each of us exercise.

To *neglect* such opportunities as cannot fail to come to each of us, sooner or later, *is surely nothing less than criminal*, criminal in its effect, not only at the moment, but for an immeasureable future.

Surely, we may say, as we think of our responsibilities in this matter of the common health and well-being, "no man liveth to *himself*, and no man dieth to *himself*."

LECTURE TO CONGRESS,

By MALCOLM MORRIS, F.R.C.S.Ed., M.R.C.S.Eng.

TUBERCULOSIS.

When the Council of the Sanitary Institute invited me to address this Congress, I need not say I felt it as a great honour. But I must frankly own that I felt it even more as a burden; for in the Temple of Sanitary Science, so many of the priests of which I see before me, I can only claim a place among the laity. In this assembly I am like Saul among the prophets; and, if I may judge from my own feelings, the King of Israel must have felt the situation the reverse of comfortable. And my position is much worse than his, for I am not protected by the divinity that doth hedge about a king, and makes his most commonplace remarks seem words of wisdom. So conscious indeed am I of my own unworthiness to occupy this place that I should not have accepted the perilous honour thrust upon me, but for the knowledge that my humble personality counted for nothing in the matter. I come here solely as representing an idea.

I have no pretension to teach you new truths, and I have no fresh facts to bring before you. That I must leave to the experts. Nor have I any intention of marshalling an imposing array of figures for your edification. There is no lack of such statistical reviews at the present time; and all that arithmetic can teach about tuberculosis has been admirably set forth by Dr. Ransome, Dr. Tatham and others. As the representative, and the advocate of an idea, I take it that it is my business here not to tell anew twice-told tales, but to try to further the realisation of that idea. The addresses at the International Congress on Tuberculosis, recently held in Berlin, are described by one of the Delegates of Her Majesty's Government in his official report on that great meeting as "expository and hortative." These words seem to me most accurately to express the scope, purpose and character of such an address as I may without intolerable presumption deliver to you to-night. I propose, therefore, to expound, in its broad lines, the pol

of the National Association for the Prevention of Consumption, of which I am for the moment the spokesman, and about which there appears still to be a good deal of misconception in various quarters; and to exhort you to help us to carry it into effect.

Is a Crusade expedient?

At the outset, however, we are met by a question which must be answered before we go further: Is a crusade for the suppression of tuberculosis expedient? One might have thought that such a question could not be seriously asked in regard to a disease which is estimated to cause one-seventh of all deaths throughout the world, and one-eighth of our own mortality. But it has been asked, and by persons who must be listened to with respect. In the address on Medicine delivered before the British Medical Association the other day at Portsmouth, Sir Richard Douglas Powell, after pointing out that we here have been behind our Continental brethren "in grasping the full significance from a prophylactic point of view of the discovery of a definite infective bacillus element in the disease," went on to say:—

"For our sins in this respect, and perhaps in part, because there are political and commercial as well as human interests concerned in the further measures necessary, the question of the prevention of consumption, which should have been calmly and forcefully considered as heretofore by experts in human and veterinary medicine, has become the subject of popular agitation, with all the reckless exaggeration and no little threatening of the social tyranny which such agitation tends to produce."

He further said: "The whole subject seems to me, however, to have been well and fully discussed by delegates from all parts of the world at the Berlin Congress; and I believe that the careful, temperate, and broad-minded summary of the proceedings added by Dr. Pye-Smith to the report of the British delegates, will do much to bring the matter again within the sphere of sober, practical work, on the part of private medical men, and the proper State departments."

I have quoted the whole of this passage, because, while it contains the sum and substance of the objections that have been raised to the crusade, it also supplies material for their refutation. What, in fact, is, according to Sir Richard Douglas Powell, the head and front of our offending? That we have set on foot a "popular agitation." Well, I should not myself have chosen that particular expression, with its political, theological, and other connotations, to describe an endeavour to

enlist the co-operation of the people with the medical profession in its warfare against a scourge more destructive than all other infectious diseases put together. But I am not frightened by words, and if tuberculosis can be abolished by "popular agitation," I say, By all means let us agitate. In so good a cause even a little exaggeration might perhaps be pardonable. But as a matter of fact there has been no exaggeration whatever. The case has been put before the public by the accredited representatives of the "National Association for the Prevention of Consumption and other Forms of Tuberculosis" in a manner just as careful, temperate, and broadminded as the summary of the proceedings at Berlin, which Sir Richard Douglas Powell holds up for our admiration. That summary, indeed, with a little expansion in the direction of practical recommendations, might serve as a "symbol" of the creed for which we are striving to gain popular acceptance. Without this, all the calm and forceful consideration which can be given by experts in human and veterinary medicine will lead to little in the way of practical result for generations to come. Experts may discover new truths. But mere discovery avails little till the knowledge gained thereby becomes diffused so as to inform the public mind and become a principle of popular action. It is this desirable consummation that in the case of tuberculosis we wish to hasten, and for this an appeal to the people is necessary, for it is the people themselves that must work out their salvation.

As for the "social tyranny" of which there is said to be no little threatening, it exists only in the imagination of our critics. Is it social tyranny to seek to persuade tuberculous sufferers not to scatter infective matter from their lungs broadcast among their fellow-creatures? Is it social tyranny to warn mothers that the kiss of a consumptive person may be harmful to their children? Is it social tyranny to suggest that damp dusters should be used in the house, and that streets should be watered before they are swept? Is it social tyranny to hint that there may be death in the milk jug, and to ask that common care should be exercised by farmers and by dairymen to keep the milk which they sell free from tuberculous contamination? I have not the slightest doubt that Sir Richard Douglas Powell himself does his best to impress the need for all these precautions, which are the mere rudiments of sanitary decency, on those who seek counsel of him, but I do not think it would be right on that account to denounce him as a social tyrant. All that we aim at doing is to open people's eyes to a real danger, and to the possibility of lessening that danger to vanishing point. The production of a panic is no part of our programme.

So far indeed from wishing to establish a sanitary reign of terror, we come forward to protect the people from fanatical sanitarians who would institute a policy of "Thorough" in regard to tuberculosis which might justly be described as social tyranny.

I have said that the passage which I quoted from Sir Richard Douglas Powell's address supplied materials for the refutation of his objections. And, in fact, could there be a more conclusive reply to his charge against us of setting up a "popular agitation" than the warm approval which he expresses of the Berlin Congress? For have we not Dr. Pye-Smith's testimony to the fact that "the object of the Congress was to interest and instruct, first, medical practitioners; secondly, the official and political classes; and, thirdly, *the mass of the people of the German Empire*, in the ascertained results of researches into the origin, nature, prevention, and general methods of treatment of tuberculosis." "The aim of the addresses," we are further told, "was to call attention to well-established conclusions, and to enforce their practical bearing on the endeavour to prevent the spread of tubercular diseases, and to treat them when present with success." Well, gentlemen, that may be taken as a statement of the objects of our Association. All the elements of "popular agitation" that can be discovered in our crusade were conspicuous in the gathering at Berlin: the patronage of Royalty; the active sympathy of great officers of State; the co-operation of engineers, architects, clergymen, politicians, and philanthropists with the medical profession; the endeavour to interest and instruct the mass of the people. So completely are we in sympathy with the aims and methods of the organisers of the Berlin Congress, that we have arranged to hold another on exactly similar lines in London in May, 1901. We have been led to this decision by the belief, which we share with the delegates of her Majesty's Government at Berlin, "that much good will result from the Congress by the prominence given thereby to the subject, and by a general diffusion of information as to the nature of the disease and the precautions which should be taken against it." All this being so, it is not altogether easy to understand why Sir Richard Douglas Powell should curse here what he ostentatiously blesses at Berlin.

It may, however, be urged, with much greater show of reason, that the prevalence of tuberculosis has very greatly diminished during the past half-century, and that it may be expected to go on diminishing; why then alarm the public mind about a danger which is not now very formidable and is daily becoming less? To this I reply once more that we do not wish

to raise a cry of alarm, but only to sound a note of warning. That the danger still existing is sufficient to justify us in doing this is surely proved by the facts that tuberculosis at the present time causes one in every eight deaths in this country; that of all deaths occurring in these kingdoms between the ages of twenty-five and thirty-five nearly one half are due to consumption; and that some 300,000 persons are at this moment suffering from the disease in Great Britain. Further, this number, vast as it is, only includes cases in which the disease is declared; there must be many thousands besides in which it is still latent.

It is true that the ravages of tuberculosis are less terrible than they formerly were. The records of the Registrar-General show that while in 1838 the death-rate from consumption was more than 3,800 per million of population, in 1896 it had fallen to 1,305, showing a diminution of nearly two-thirds. Moreover, the diminution has on the whole been steadily progressive. Dr. Arthur Ransome has calculated that "if phthisis were to continue to decrease at the same increasing rate of diminution for another thirty years it would then have entirely disappeared." But will it continue to decrease at the same increasing rate? There's the rub!

Dr. Ransome attributes the diminution that has taken place to land drainage and other measures of sanitary reform, and to the betterment in the general conditions of life among the working classes that has marked the period of Queen Victoria's happy reign. I think there can be no doubt that these are the true causes of the mitigation of the scourge, and indeed there have been no other causes at work capable of producing the effect. We have seen that, in spite of its lessened ravages, tuberculosis still claims an enormous annual tribute of lives, to say nothing of the incalculable amount of ill-health, suffering, and impaired efficiency for which it is responsible. No special measures have hitherto been employed aiming directly at the [illegible] of the disease. Is it not worth while now to try the effect of such measures, and by assuming the aggressive to complete the victory, which the defensive warfare of sanitary reform has already half won for us? It may, I think, be said that science has now done all that with our present knowledge [illegible] itself. Science can only indicate the means by which the people can work out their deliverance; "who would be free themselves must strike the blow." To secure the co-operation of the people and to direct its action in an aggressive warfare against the tubercle bacillus is the object of the National Association for the Prevention of Consumption and [illegible] Forms of Tuberculosis.

THE ASSOCIATION FOR THE PREVENTION OF CONSUMPTION.

This Association, though it has been in existence only a few months, has been before the world sufficiently long to make it superfluous for me to say much about it here. His Royal Highness the Prince of Wales is its President, and among the Vice-Presidents are Lord Salisbury, Lord Rosebery, and others among the foremost men in the political world, the Lord Chief Justice of England, the President of the Institution of Civil Engineers, the President of the Royal College of Veterinary Surgeons, the President of the Royal Agricultural Society, besides all the official heads of the medical profession. There is scarcely an Association in the Kingdom that can boast such distinguished patronage, and probably none that within so short a time since its foundation has spread more widely through the land. Already some five and twenty branches have been established in different parts of England, Scotland, and Ireland, and among the members of all those branches are the men of local light and leading. Our numbers are as yet inconsiderable, but as to that I feel, like King Harry at Agincourt: "The fewer men the greater share of honour," for the rest of us. With a small army, but with large aims and high hopes, we enter on a campaign against the deadliest enemy of our race and of the whole human family. We have declared war against the tubercle bacillus; and it is to be a war of extermination.

GENERAL IDEA OF THE CAMPAIGN.

We know where the enemy should be looked for, and we know how to kill it. Theoretically, tuberculosis could be suppressed by the destruction of the infective material actually put into circulation by sufferers, and by cutting off the supply of fresh infection at its sources. These sources are in general terms (1) infected persons; (2) infected dust, fabrics, and furniture; (3) infected food-stuffs; and (4) infected animals. In regard to all these things there are measures of protection which can be taken by the State, by municipal and local sanitary authorities, and by the individual respectively. The concentration of these various forces to one objective is what is called, in military language, the "general idea" of our campaign. Let us briefly consider what each of these forces can do, and ought to do, for the prevention of tuberculosis.

WHAT THE STATE CAN DO.

With regard to the State, Lord Salisbury at the meeting in furtherance of the objects of the National Association for the Prevention of Consumption and other Forms of Tuberculosis,

held at Marlborough House last December, warned us to be content with preaching the salutary doctrine which we hold, and not to think of asking for the help of the secular arm in enforcing it. In that view, as a general guiding principle, we heartily concur. Yet we do not think that in our war against tuberculosis the State should be content to maintain an attitude of benevolent neutrality. The secular arm can help us very much indirectly.

The Condition of the People Question.

There is, for instance, what Carlyle called "the condition of the people question." Dr. Ransome has shown how intimately this is connected with the question of the prevention of tuberculosis. The first great drop in the death-rate from consumption took place in the decade 1840–50, when serious attention began to be given to the safeguarding of the public health, and the work of land drainage was undertaken. After remaining stationary for some years, it again began to decline, and the reduction has been steadily continuous during the past thirty years, thus coinciding with the great sanitary wave that has swept over the country. In this work of the betterment of the condition of the people the State has played a leading part by the passage of the Public Health Acts, the Factory Acts, the Housing of the Working Classes Act, the Infectious Diseases (Notification) Act, and the more recent legislation concerning unhealthy trades and the supervision of the sale of food. All this has a very direct bearing on the prevention of tuberculosis, for a well-housed, well-fed, and well-clothed population is thrice-armed against the tubercle bacillus.

The Condition of the Cattle Question.

For these mercies we have reason to be thankful, but I think the State might go further and deal with what may be called the condition of the cattle question. Germany has most stringent laws directed to the prevention of bovine tuberculosis. In France there is a permanent section of the Académie de Médecine which has done much to promote legislation regarding cattle. Of the United States sixteen have regulations for the repression of tuberculosis in bovine animals. In this country the principle, *Caveat emptor*, still prevails in regard to cattle. Yet from cattle much human tuberculosis is derived, and accordingly it is on the healthy condition of cattle that immunity from the disease in children in a large measure depends. If we can abolish tuberculosis in the bovine species we shall be far on the way towards the deliverance of the human race from the scourge. As a first step the recommendation of the Royal Commission on

Tuberculosis that no meat from cattle affected with general tuberculosis should be allowed to be sold for food, should be acted upon. Foreign cattle should be inspected, and isolated if there be suspicion, destroyed if there be certainty, of disease.

The Tuberculin Test.

How, it may be asked, is the existence of general tuberculosis to be recognised in an animal, seeing that it is not always easy to be sure of its presence in a human being? Fortunately there is a test which may be accepted as sufficiently trustworthy for all practical purposes when rightly used. This is tuberculin, which, though a failure as a therapeutic agent, has fully vindicated its character as a diagnostic reagent. I do not propose that the tuberculin test should be made compulsory in our home-bred herds. The British farmer may be persuaded to use it; he certainly will not be compelled, and Lord Salisbury has plainly told us the Government will not attempt to compel him. But at least the State should protect us from the importation of tuberculous cattle from abroad. Care would have to be taken to prevent any evasion of the tuberculin test, such as is said to be practised in certain foreign countries. It is well known that for some time after the injection of tuberculin even an animal affected with tuberculosis will not react. Acting on this knowledge exporters of stock to countries where the tuberculin test is enforced "salt" the animals beforehand to a degree sufficient to enable them to undergo the test satisfactorily. Imported cattle should therefore be kept in quarantine for a period of time long enough to remove this source of fallacy.

As regards our home-grown tuberculosis, stockbreeders are already beginning to appreciate that it is their interest to keep their cattle uncontaminated, and that this can be done only by eliminating from their herds any beasts that show signs of the disease, or in whom its presence is revealed by tuberculin. They are beginning in fact to find that tuberculin is a protection to the farmer as well as to the public. And before long those of them who are most doggedly determined to stand upon the ancient ways will be compelled to enter on the new path of sanitary righteousness by public opinion, which, as it becomes more and more fully educated on the subject, will insist on every possible precaution being taken by all concerned in the supply of meat and milk, from the stockbreeder to the retail vendor. I venture to commend to all farmers the excellent example shown by Her Majesty the Queen, who not long ago did not hesitate to sacrifice thirty-six of the dairy cows at her Home Farm, which on being tested with tuberculin were found

to be affected with tuberculosis. The late Lord Vernon may be cited as the exemplar of an enlightened cattlebreeder; his farms at Sudbury were models of sanitary management, and his success was, I believe, mainly due to the fact that he conquered disease by the aid of tuberculin.

But, it may be said, this counsel of perfection is all very well for royal personages or philanthropic peers, but it will not do for farmers, who must live, and therefore cannot afford to sacrifice their stock to a scientific theory. To this, I reply, that tuberculosis is not a theory but a too solid fact. The public have also a right to live, and can hardly be expected to run the risk of dying that the farmers may live. As a matter of abstract justice I am not disposed to admit that a man is entitled to compensation for loss which he may suffer by the destruction of tuberculous cattle, for he has no right to offer such dangerous merchandise for sale. The following letter which I find in Dr. Knopf's recent work, *Pulmonary Tuberculosis: Its Prophylaxis*, puts the case so clearly that I venture to quote it. It is written by Dr. Hurty, Secretary of the City Board of Health, Indianapolis, and is dated February 7th, 1898:—

"In this city, Indianapolis, a good work towards the suppression of tuberculosis is being done without the intervention of the law. The City Board of Health induced one of the prominent dairymen to write a letter requesting that his herd be tested with tuberculin, and that a sanitary survey be held of his dairy, and suggestions be made for sanitary improvements, he promising to destroy all the cattle which reacted to the tuberculin test and make all the sanitary improvements suggested. [illegible] was to receive a certificate from the Board of Health, [illegible] stating the facts of the case. This, you see, was a true [illegible] method. The work was done, as above indicated, and immediately the popular demand arose for the milk supplied by tuberculin-tested animals. Every dairy supplying milk to the city has now been tested, and sanitary surveys made, as above. About 6 per cent. of the dairy cattle have been killed, and in every instance it was discovered that the tuberculin test was accurate and absolute. This method seems better than the legal method. Some of the poor dairymen have rebelled somewhat against the loss of their animals, but the answer given them is final and complete, viz., *that no matter how poor they are, or what financial injury may be brought to them, still they must not furnish milk which will probably produce disease and death.* I believe, however, it would not be bad policy for the State to pay one-half the value of the cattle slaughtered on account of tuberculosis."

I also think it would be to the public interest if the State

were to pay something in the way of compensation in such circumstances, but it should be made clear that it is in the nature of a compassionate allowance and not in recognition of a rightful claim.

The letter just quoted well illustrates the true method of inducing cattle dealers and milk vendors to submit to a test which is necessary for the public security; and I agree with Dr. Hurty that the commercial method is better than the legal method.

As an excellent illustration of the "commercial" as distinguished from the "legal" method, I may refer to the system which has been adopted by one of the most important of our Dairy Companies as the outcome of the present movement for the prevention of tuberculosis. The form of contract with farmers who offer to supply milk is so worded that it gives the Company almost absolute power immediately to stop the supply of milk either from a whole herd or from individual cows. As soon as a new farm is taken on, the cows are inspected by the Company's local veterinary surgeon, who puts aside any cow not in good health; and, if there be symptoms suggestive of tuberculosis, tests it with tuberculin. Further periodical inspections of each individual cow are made monthly. When there is reason to suspect tuberculosis, the option is given to the farmer of disposing of the animal at once, or submitting it to the tuberculin test. Any animal reacting is at once drafted from the herd. The system is in fact a combination of frequent clinical examination of all cows supplying milk and the use of the tuberculin test, the latter being virtually a Court of Appeal to which the farmer can have recourse, if he challenges the clinical diagnosis. The effect of the system during the short time it has been in operation has been to reduce the number of animals condemned for tuberculosis almost to zero. The method seems to afford protection as complete as is possible under present conditions to the consumer, while equally protecting the farmer from unfairness arising from the errors incident to diagnosis made on symptoms alone.

The chief difficulty in enforcing the "legal" method is of course the question of compensation. But when farmers fully grasp—as with the diffusion of knowledge they are sure to do in time—the truth that the elimination of unhealthy stock is a gain rather than a loss, the difficulty will be removed. The tuberculin test should, of course, be carried out at the public expense. In this matter the Danish Government has shown a good example by giving every encouragement to farmers to submit their cattle to the test.

Professor Bang of Copenhagen, who is one of the foremost

authorities on the subject, has demonstrated the possibility of stamping out tuberculosis among herds by removing all beasts that react to tuberculin, and by keeping under rigorous supervision the calves of animals in whom there may be reason to suspect tuberculosis. The following account of Bang's views, as summarised in the Report of the Royal Commisson on Tuberculosis, may be quoted, as it forms the basis of a national scheme for the introduction of the use of tuberculin by stock-breeders, which was suggested by the Commissioners, and might with the greatest advantage to the community be adopted:—

"The views of Professor Bang in regard to bovine tuberculosis are, briefly, that it is due to the ease with which the infection may spread by air, water and food, owing to the common life of healthy and unhealthy animals when in confined, badly ventilated sheds. About 0·3 to 0·4 per cent. of all calves born, he thinks, are affected with hereditary tuberculosis; but the great majority of calves that become tuberculous are infected through milk. Practically, then, if calves born of tuberculous mothers are isolated from diseased animals, from and after birth and fed on boiled milk, they will escape the disease. Tuberculin, he believes, gives trustworthy results in over 90 per cent. of the animals tested, and in the great majority of those which react, the test reveals only *latent tuberculosis*. By merely separating the sound from the reacting animals, feeding the calves born from the first day of life on boiled milk, submitting once or twice a year the healthy animals to a fresh test, placing such as react on the other side of a partition, and purchasing only animals that have stood the tuberculin test, he believes that in a few years a healthy herd may take the place of one that had been markedly affected."

Compulsory Notification.

Passing from the safeguards which we have a right to expect from the State for the prevention of the transmission of tuberculosis from cattle to human beings, I must say a few words as to its position in regard to the prevention of such transmission from human beings to each other. It has been suggested that the notification of tuberculosis should be made compulsory. This in itself would undoubtedly be a good thing, and it may come in time. But the time is not yet. The majority of the medical profession are opposed to it, and even if they were favourable to such a measure, the people would certainly not submit to what would indeed be "social tyranny" of a highly disagreeable kind. It may be noted by the way that the notification of consumption is not altogether a new thing.

Venice, Naples and others of the Italian States, and in some parts of Spain all cases of consumption had in the last century to be notified, not only by doctors, but by priests and nuns who ministered to the sick. The duty was greatly disliked by the medical profession; and if we may judge from the extreme severity of the penalties imposed for failure in its performance—which included not only heavy fines, but imprisonment and the galleys for long terms of years, and prolonged banishment—it must, in their opinion, have been more honoured in the breach than in the observance. Of the results of those measures in the repression of consumption no evidence seems to be forthcoming, but in any case they could scarcely be counted as having any scientific importance.

The argument for the compulsory notification of phthisis has recently been at once so strongly and so temperately put forward by Dr. Byrom Bramwell, of Edinburgh, that I do not think I can discuss the question more profitably than by using his paper,* as a text for commentary.

Dr. Bramwell contends that if the object of our crusade is "to make a determined and vigorous effort to completely eradicate phthisis, or at all events to reduce the prevalence of the disease to the greatest extent attainable . . . . some system of compulsory notification is essential and necessary, for without compulsory notification our efforts to prevent the tubercle bacillus being conveyed from one human being to another human being must necessarily . . . . be very inefficient." The compulsory notification of an infectious disease is not, however, in itself a preventive; it is of use only as directing the attention of sanitary officials to the focus of infection which they can proceed to extinguish or remove. Notification must therefore be followed by isolation, and this is admitted to be impracticable as a general measure in the case of tuberculosis. Dr. Bramwell quotes Dr. Newsholme as saying: "In practice segregation of the phthisical patient, except where it is voluntarily in the interest of the patient, is entirely out of the question." Dr. Bramwell himself is fain to confess that in the meantime we must be content to rely on persuasive efforts. Nevertheless, he pleads for some system of compulsory notification, specially adapted to the peculiarities of phthisis, as it is only by this means that phthisical patients and phthisical centres can be located in anything like a complete way, and though he allows that such a system would involve a very large expenditure of money, he thinks the financial argument *per se* is not sufficient to negative the

* Medical Magazine, June, 1899.

proposal. I fear, however, that the ratepayer who is already sorely burdened in the name of sanitation would be of a different way of thinking; at any rate he might excusably determine to wait until the doctors were agreed on the subject.

Unofficial Notification.

It is clear, however, that notification must be the basis of any effective administrative measures of reform, for unless the places where the enemy lurks are known he cannot be exterminated. As we cannot have compulsory notification, could not a system of notification without compulsion be established? The scheme of the National Association for the Prevention of Tuberculosis includes missionary work by lay members as well as by the medical profession. One form of this method might be the discovery of cases among the poor and the unofficial notification of them to the health authority. For the work of such a volunteer intelligence department ladies would, I think, be particularly well-fitted, and in this way they might help the cause better, perhaps, than in any other. It may be well in connection with this matter to emphasise the fact that we do not wish in any way to interfere with private practitioners or to encumber the medical officers of health with unsolicited help. I think, however, that the co-operation of lay workers in the manner suggested under the guidance of the Association would be hailed by most sanitary authorities as a valuable assistance. Compulsory notification, on the other hand, would be certain to lead to much friction between medical officers of health and private practitioners.

This has been the case in New York, where a modified system of compulsory notification has been in force for some time. Knopf, whose book on the prophylaxis of tuberculosis has already been quoted, says: "Experience has demonstrated that the compulsory registration or reporting of tuberculous cases finds little favour with the general profession. The controversy which went on between the Board of Health of the City of New York and the medical profession at large of that city is perhaps the best proof that the time for such radical measures has not come yet." It should in fairness be added that the results of the system as reported by Dr. Hermann Biggs, to whom its introduction was mainly due, have apparently been fairly satisfactory. But it must be remembered that sanitary authorities in the United States are more "forceful" in their ways than ours, while the American people is more intelligent—or more submissive—than the British. On the whole we may say of Dr. Byrom Bramwell's scheme that it is magnificent but it is not war.

What Municipal Authorities can do.

I can only touch very lightly on the action of Municipalities and Local Sanitary Authorities; and, indeed, this is a branch of the subject which can be discussed in detail only by those who have a practical knowledge of the conditions and limits of local administration. But it may be stated in general terms that the municipal powers, that be can do much indirectly by giving practical effect to Acts of Parliament directed to the amelioration of the condition of the people, notably in the drainage of soil, the cleansing of towns, the prevention of overcrowding, and the provision of healthy dwellings for the poorer classes. The housing of the poor is one of the great social problems of the day, and its satisfactory solution is a necessary preliminary of the campaign against tuberculosis. For tuberculosis, like some other evil things, loveth not the light. Its favourite haunts are dark, damp, dirty, unventilated, overcrowded tenements. The clearing of slums is the destruction of the first line of defence of the bacillus. This has been clearly shown by Dr. Ransome's inquiries as to tubercular infective areas in Manchester; by Dr. Biggs in relation to New York; and by Dr. A. K. Chalmers in regard to Glasgow.*

Supervision of Meat and Milk Supplies.

Local Authorities can also do much directly towards the suppression by the supervision of the milk and meat supplies, and by insistence on certain elementary hygienic precautions. As regards the milk supply, many of the larger corporations have already shown themselves fully alive to their responsibilities, and insist on dairymen notifying the existence of tuberculosis of the udder among their cows to the Medical Officer of Health, and on the inspection of suspected cows by a veterinary surgeon, and the application of the tuberculin test where it is judged necessary. Besides this, all byres should be subject to inspection, and to condemnation if their state be such that healthy animal life is impossible in them. Equal stringency should be exercised in the supervision of the meat supply. In this we are far behind Germany and some other countries. Public abattoirs should be provided, and the carcases of all animals slaughtered should be examined by specially trained inspectors before the meat is allowed to be sold.

The Suppression of Public Spitting.

Another regulation which I should like to see made and strictly enforced by all Municipalities and Local Authorities

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* See *Practitioner*, June, 1898.

throughout the land, is one prohibiting the filthy practice of spitting in public. Our streets, our omnibuses, our railway carriages are at present befouled by spittle, in a manner which is always disgusting and often dangerous. The expectoration is the commonest vehicle of tuberculous infection. Even in early stages of phthisis the sputum contains myriads of bacilli. As the sputum dries these are set free, and, "horsed on the viewless couriers of the air," are carried into the bodies of thousands of people. The removal of this one source of danger would of itself lead to a large diminution in the prevalence of the disease.

America, where spitting in public places used to be looked upon as a sign of republican freedom, is now far ahead of us in this matter. Several States have enacted stringent ordinances on the subject, and they are not allowed to remain a dead letter. Not long ago—in Chicago, if I remember aright—a millionaire was fined, with the alternative of imprisonment, for committing what is not only a sanitary crime but an offence against public decency. In France also spitting is strictly forbidden in barracks and schools; prohibition notices are also posted up in omnibuses. By-laws should be made by every local authority making spitting in public places a punishable offence and should be strictly enforced.

SANATORIA.

Another way in which municipalities can most powerfully help in the abatement of tuberculosis, is by the erection of sanatoria in which the disease can be treated in its early stages when it is, if not, as a distinguished French physician has said, the most curable of all chronic diseases, at least eminently tractable. Unfortunately, we have not yet an immunising or a curative serum for tuberculosis; the donkey and the goat, each of which has been vaunted as the Gilead from which balm was to come, has disappointed the hopes of their devotees. The only remedies for consumption, as Sir Samuel Wilks has said, are air and sunshine, and, as you know, it is these remedies, together with rest and abundance of food, which it is the object of sanatoria to provide. I may remark, parenthetically, that there is nothing new in the open-air treatment of consumption. Pliny the Elder knew how beneficial sunlight and air laden with the scent of pine forests are in phthisis. Galen sent his consumptive patients to high altitudes, and Avicenn states that he had cured cases in the same manner. The re pioneer of the modern open-air treatment, however, was Englishman, George Bodington, a surgeon of Sutton Coldfie in Warwickshire, who in 1840 published an essay on "T

Treatment and Cure of Pulmonary Consumption," from which it is clear that he had anticipated Brehmer and Dettweiler in their special doctrines. He had also actually opened a sanatorium where the method was carried out. Practically the same doctrine was preached by the late Sir Benjamin Ward Richardson in 1855-56, and was embodied by him in a "Sanitary Decalogue" for the prevention of consumption, which he drew up for the Ladies' Sanitary Association.

In no other way can the benefits of the open-air treatment be brought within the reach of the poor than by the erection of sanatoria for their reception. A sanatorium has a twofold object: (1) As a means of isolating sufferers who outside would be centres of infection to others. (2) As places where the best treatment can be given to patients who could not otherwise get it. The consumption hospitals can take only an infinitesimal fraction of the sufferers who need treatment; yet limited as their resources are they do excellent work, and to them Knopf attributes a good deal of the reduction in the amount of phthisis that has taken place in this country. But what are the half dozen or so of such institutions which already exist among so many sufferers?

Each city and town should have its own sanatorium, as is already the case in Switzerland. There are several sanatoria for the poorer classes in the United States, the first of which was opened in the Adirondack Mountains by Dr. E. L. Trudeau in 1884. What excellent results those establishments can show in the way of cure may be gathered from the following figures: Adirondack Cottage Sanatorium for Consumption, 20-25 per cent. of cases cured; 30-35 per cent. improved. Loomis Sanatorium, Liberty, New York, 25 per cent. cures; 50 per cent. amelioration (70 per cent. in early cases). Sharon Sanatorium, near Boston, Massachussetts, 25 per cent. arrested cases; a much larger percentage improved. The corresponding figures for the Falkenstein Sanatorium for the Poor, which has now been transferred to Ruppertshain, are 13 per cent. absolute cures; 77 per cent. amelioration. The records of the Halila Sanatorium for the Poor, in Finland, show 36·7 per cent. of cures. These figures compare very favourably with those of the general hospitals, and the cost of the treatment is much less. Knopf states that 2,000 tuberculous patients in the general hospitals of New York, with very little chance of recovery and considerable risk of damaging others, cost the city 1,044,000 dollars. Treated in sanatoria these patients would have cost only 890,000 dollars, while their chance of recovery would have been from 20 to 50 per cent. higher, and they would not have been the means of spreading infection.

Insurance against Tuberculosis.

In Germany sanatoria for the poor have been established by municipalities, by benevolent associations, such as the Red Cross Society, and by State Invalidity Insurance Companies. Every German working man and artizan must, as is well known, be insured against sickness, accident, and old age. If he shows signs of tuberculosis he is at once sent to a sanatorium. The number of these is constantly being added to. Thirty-seven of these State insurance companies, according to the reprints for 1897, assisted 4,480 consumptives of whom 4,432 were sent to subsidised sanatoria. Nearly all the companies contribute to the maintenance of these institutions; some have found it profitable to erect sanatoria of their own. During 1897 these companies collectively invested 1,300,000 marks in sanatoria for consumptives, and according to the *Heilstätten-Correspondenz*, a fund of between three and four million of marks was allocated for that purpose in 1898. France, Norway, and Russia have State sanatoria for the poor, and steps are being taken for the establishment of similar institutions in Belgium, Italy, Portugal and elsewhere.

It may be pointed out here that the establishment of sanatoria for the poor has not been dictated by pure philanthropy. The life of every worker in the human beehive has a money value, and his disablement by illness represents a loss to the community. The German Invalid and Old Age Insurance Companies noticed that the great majority of the persons drawing sick pay were suffering from tuberculosis, and they conceived the idea of saving themselves this expenditure by preventing their tuberculous pensioners from becoming disabled. This led to the institution of the sanatorium system, the economic results of which have fully justified the hopes of those who originated it. The Imperial Health Bureau has made the following estimate of its economic and social advantages. Assuming that of the 90,000 persons who die each year in Germany of pulmonary tuberculosis, 12,000 are selected for treatment, and that of these 9,000 are thereby enabled to go back to work for three years, and putting the annual wage at an average of 500 marks (£25), the profit to the community will be $3 \times 500 \times 9{,}000 = 13{,}500{,}000$ marks (£675,000), or deducting the cost of treatment and the interest on capital, 7,500,000 marks (£375,000).

As we have not State insurance of the working-classes in this country, it would be impossible to introduce the German system here. The duty of founding sanatoria for the poor must fall on the municipalities and the Poor Law authorities.

These are beginning to move in the matter, and the Association for the Prevention of Consumption will endeavour to keep their courage screwed to the sticking point. It is also part of the programme to establish sanatoria, but for a different class, those namely who can pay a small amount for their maintenance. These are often the most deserving as they are the most helpless of the poorer classes, for while they are above charity, they do not share in what may be called the privileges of poverty naked and unashamed. It appears to me that money could hardly be better expended than in furtherance of this object.

What Individuals can do.

But when the State and the local authorities have done all that in them lies for the prevention of consumption, a good deal still remains to be done by the individual. As to this I need say little here. The public has now every opportunity of getting instruction on all points concerning the hygienic measures which every one should adopt who wishes to protect himself and those under his charge from tuberculous infection. The two chief precautions are the destruction of all sputum, which should be expectorated into paper spittoons or handkerchiefs made of Japanese paper which can be burnt immediately, or into special receptacles containing a disinfectant solution. The other is the sterilising of all milk before it is used as food. As regards meat, the experiments of the Royal Commission on tuberculosis showed that even cooking does not suffice to make a large joint harmless; in this matter, therefore, we are more or less at the mercy of our butcher, and can only do our best to induce the local authorities not only to make strict regulations as to the sale of meat, but to enforce them.

After all, the best way to avoid tubercle is to trust to those natural disinfectants—air and sunshine—and to use them liberally. Man is naturally refractory to tuberculosis, and as long as he keeps his general health at the highest standard, he is practically proof against its attacks. The open air in the day, and the open window at night, is sound sanitary policy. In free ventilation lies our best means of safety. Lord Beaconsfield said, perhaps with more truth than he was aware, "The atmosphere in which we live has more to do with human happiness than all the accidents of fortune and all the Acts of Government." No one is more prone to become tuberculous than a man or woman who is overworked, and lives constantly breathing foul air and in unhealthy surroundings.

The Prospects of the Crusade.

I hope I have succeeded in convincing you that the movement for the suppression of tuberculosis is expedient. But is it likely to be successful? I have no hesitation in saying that it is. Pasteur said that it was in the power of man to cause all parasitic diseases to disappear from the world. In the case of tuberculosis the question is simply one of knowledge and the application of knowledge. We already have all the knowledge that is necessary; the only real difficulty lies in getting the State, the local authorities, and the individual to apply that knowledge. This is the special mission of the National Association for the Prevention of Consumption and other Forms of Tuberculosis. If our aim appears quixotic, we can plead that in a matter of such vital importance to the community it is surely better to aim too high than too low. If we are scoffed at as enthusiasts, we can reply that no great cause was ever won in this world without enthusiasm. But, I repeat, we can do nothing to help the people in shaking off the yoke of the tubercle bacillus unless the people help themselves. As Lord Salisbury said, "It is the public only who can effect a change and it is only by public knowledge any real good will be done." In a word, the crusade which we preach is a national crusade against a national scourge, and, I may add, that our battle [illegible]

POPULAR LECTURE,

By BAILIE DICK, J.P., Glasgow.

It is now a good many years since I first visited an "Infectio Diseases Hospital," and it was, I think, upon that very fir visit that I caught some infection, or brought away with m a bacillus or microbe, which has not yet been identified, but o which must have found a congenial soil, for it developed some what rapidly into a fever unknown to the medical faculty.

Without consultation with any of our associations learned i such matters, I have ventured to name this new fever "Hospita Enthusiasm," and under this fever I have now suffered for

good many years. It shows no sign of abatement, seemingly has no fixed period to run, and defies the treatment of the Members of the General Medical Council, The Sanitary Institute, and all similar associations. Its outward manifestations are that the patient becomes a nuisance to his friends, if not a source of danger, and, so far as I have discovered, the only means of avoiding such consequences is the voluntary adoption of a metaphorical "strait waistcoat," in the form of a strict watch over that unruly member, the tongue, in the daily intercourse which the patient has with his friends.

Otherwise it is as impossible for the patient to keep it out of his conversation as it was for my respected namesake to keep the head of Charles the First out of his numerous memorials.

Recognising from my own experience how few people know much about an infectious diseases hospital, or of its administration, and how desirable it is that all classes should be fully acquainted with the great value of these institutions, I thought I might have some views prepared to furnish a text for a little talk about such a hospital and its administration and adjuncts.

The subject of my little talk then to-night is "An Infectious Diseases Hospital."

Following the advice of Mr. Ruskin, that wonderful master of the English language, to ascertain the original meaning of the words used to describe any subject one is dealing with, we find that *a hospital* means a shelter or home for strangers. *Disease* means the absence of ease, the negation of ease, as discomfort is the absence or negation of comfort—that condition so well described in Holy Writ: "In the morning these shall say, would God it were even, and in the even, would God it were morning."

Infectious means something that may be communicated from one person to another, so that "An Infectious Diseases Hospital" means a shelter, a home for strangers destitute of ease, and in a condition to communicate that lack of ease to those with whom they come in contact.

This being so, the necessity for the provision of such hospitals becomes apparent, and this policy is dictated by what I may call an enlightened selfishness, for the first function of such an institution is the preservation of the health and lives of the general community, and not the curing of the individual patient.

But it is a work of mercy, and being so, it is, and must be twice blessed, blessing both him that gives and him that takes, and is mightiest in the mightiest.

To-day that is a lesson so plain, that he who runs may read,

but so short a period as forty years ago, this was not so, and it took many stern lessons before it was learned.

Let me tell you in a few sentences what Glasgow passed through before it learned this salutary lesson. We have in Glasgow, with its tenement houses, a larger population per acre than any other of the larger cities of the Kingdom, and in its densely populated districts fever found a congenial home and suitable surroundings.

In the long closes entering from the streets the humbler citizens were closely packed together, without the means of observing decency, far less morality. Here is an extract from an official report made to the Poor Law Commissioners in 1840, by Dr. Arnot:

"We entered a dirty low passage like a house door, which led from the street through the first house to a square court immediately behind, which court, with the exception of a narrow path around it leading to another long passage through a second house, was occupied entirely as a dung receptacle of the most disgusting kind. Beyond this court the second passage led to a second square court, occupied in the same way by its dung-hill, and from this court there was yet a third passage leading to a third court and third dung-heap.

"The interior of these houses and their inmates corresponded with the exterior."

In 1842 Dr. Brown, one of the district surgeons, reports:

"64. Havannah Street contains 59 houses, all inhabited by a most wretched class of individuals; several of these (single room) houses do not exceed 5 ft. square, yet they are forced to contain a family of sometimes six persons.

"105. Havannah Street consists of an old carpet factory arranged into 36 cells, about 7 ft. square. Every inhabitant of these dens has had fever."

Another district surgeon, Dr. Strong, reports in same year:

"In a lodging house in Parkers Close saw ten individuals lying with fever at the same time in one apartment, and that den without a window."

Such places are long since swept away, but there is still room for much improvement which is being energetically pushed forward. (Pictures were shown of some of the closes swept away, but not nearly so bad as those referred to in the Report). Places such as might well be termed the homes and haunts of fever. Under such circumstances epidemics of serious character were of frequent occurence, and were dealt with by the erection of temporary hospitals (on one such occasion provision to the extent of 1,245 beds was made), doctors, nurses, and attendants secured, and when the epidemic had

spent its force, the accommodation so provided was burnt, and as Dr. Russell, our late and highly esteemed Medical Officer of Health, forcibly puts it, the doctors, nurses, and attendants, that had not been buried, were discharged.

The existence of evils such as I have endeavoured to describe, coupled with the advance of medical and sanitary science, rendered the establishment of a public health department imperative. This was accomplished in 1863, and steps were taken and Parliamentary powers procured, under which our first infectious diseases hospital was erected in 1865. Although only a temporary erection it has done good service ever since, and has at present over 200 scarlet fever cases within its walls.

The experiment proved so successful that in 1866 further powers were secured, a site comprising thirty-two acres purchased, and the erection of Belvidere hospital, at first consisting of temporary erections but gradually replaced by permanent buildings, was finally completed.

To secure the full benefit from an infectious diseases hospital, we have found two adjuncts necessary:—

1. Wash-houses for the washing and disinfection of infected clothing, beds and bedding, etc. 25,000 to 30,000 articles monthly; 1,200 to 1,500 beds, carpets, and etc.

2. Isolation or probationary houses to accommodate the remaining inhabitants of a dwelling from which a typhus or small-pox patient has been removed. Such persons to be kept in those houses under careful supervision, till all danger of their developing the disease has passed away.

By means of the notification Act, the visits of our sanitary inspectors, and the confidence of our humbler classes in our Health Department, practically all cases of infectious disease are promptly discovered and as promptly dealt with.

Although possessing compulsory powers to remove patients, in practice we do not need to have recourse to them. Our citizens have acquired such confidence in the hospital and its treatment that they are perfectly content to go there, and the little ones especially are often times eager to prolong their stay. I know of one humble man who obtained in the hospital a glimpse of such comfort and peace as he had previously associated only with the possibilities of "The Better Land," and of one girl who earnestly begged to be kept on in the capacity of a servant, and remained as such for four years. While the great majority of the patients are drawn from the humbler classes, our well-to-do citizens are now, in many cases, sharing its advantages. A brother-in law of a member of the Gilded Chamber at Westminster has done so, also the members of some of our magistrates' families, while the landlord of one

of our largest hotels, who was a patient, regularly sends a few pounds each Xmas day to purchase toys for the little ones.

What have been the results? Typhus fever, our great scourge thirty years ago, is almost extinct as these figures will show:—

1864.	Population 421,000.	Deaths 1138.	
1865.	" 428,000.	" 1177.	
1898.	" 731,000.	36 cases.	6 deaths.

and an epidemic of typhus is practically impossible.

We treated in our hospitals from 1st June, 1898, to 31st May, 1899, 7,814 Cases.

82 per cent. of all scarlet fever patients in our city were treated in our hospitals. No one pays a single penny for treatment.

Our hospital expenditure for last year was over £40,000.

Our death-rate, which ran for many years from 28 to 32 per 1,000, was last year 21·2.

In closing let me relate a little incident connected with our Probationary Homes. Calling at one of the Homes one day, I was surprised to find a little baby boy of 6 months old sleeping peacefully in a cradle. I remarked to the Matron, "This is a young inmate: what are the circumstances?" She explained, "The mother is in hospital with scarlet fever, the father has no one to attend to the child, and so it is here." Proceeding to another of our Homes, I mentioned the circumstance to the Matron of that Home, who said, "Oh, I had a much younger child here, only three weeks old, of which I had charge under similar circumstances,"—and later, on making enquiries, I found that both children escaped the disease, both mothers were nursed back to health, and both received their little ones well and strong, the fever not having touched either of them.

I never felt so proud of the city of my birth and of its great municipality, able to deal with such great matters as supplying gas, water, tramways, drainage, etc., and yet, with a heart loving enough, and a hand tender enough, thus to care for its little citizens, whose ages could be counted by months and even days, and to realise the truth of the saying of the Psalmist, "Thy gentleness hath made me great."

(The lecture was illustrated with a large number of views of the general plan and interesting features of the Glasgow Infectious Diseases Hospital).

CONGRESS AND EXHIBITION AT SOUTHAMPTON.

Report of Closing Meeting.

The closing meeting of the Congress was held on Friday, September 1st, Sir William Henry Preece, K.C.B., F.R.S., in the Chair.

Reports of the work done in the different Sections and Conferences of the Congress, and the Resolutions passed, were read by the respective Secretaries, and the Resolutions were referred to the Council of the Institute for consideration.

Proposed by Sir William Henry Preece, K.C.B., F.R.S., seconded by Sir Joseph Ewart, M.D., F.R.C.P., J.P. :—

Resolved—"That the Sanitary Institute and members of the Congress desire to express their most sincere thanks to the Worshipful the Mayor and Mayoress and the Corporation of Southampton for the cordial manner in which the Congress has been received, and for the personal kindness and hospitality extended to the members."

Proposed by Alderman J. Lemon, M.Inst.C.E., F.R.I.B.A., J.P., seconded by Major Lamorock Flower :—

Resolved—"That the hearty thanks of the Sanitary Institute and the Congress be presented to the Council and Managers of the Hartley Institution and the King Edward VI. Grammar School for their courtesy in placing at the disposal of the Congress handsome and suitable buildings for the various meetings."

Proposed by Sir Henry Duncan Littlejohn, K.C.B., M.D., seconded by R. R. Linthorne, Town Clerk :—

Resolved—"That the Council of the Sanitary Institute and the Mayor and Corporation of Southampton be requested to convey in suitable form to Her Majesty the Queen the loyal thanks of the Congress for the gracious permission to visit Osborne House and grounds."

Proposed by Alderman G. J. Tilling, J.P., seconded by Louis Parkes, M.D. :—

Resolved—"That the hearty thanks of the members of the Congress be given to Mr. W. Shore and those co-operating with him in arranging and conducting the archæological excursions; to Lady Emma Crichton; to Alderman J. Lemon, Chairman of the Works Committee; to Mr. W. B. G. Bennett, the Borough Engineer; to Alderman Walton, Chairman of the Health Committee; to the Chairman and Directors of the London and South-Western Railway; to Mr. J. Dixon; to Surgeon-General Nash and officers of the Royal Army Medical Corps; to Alderman W. Bone, Chairman of the Corporation Electrical Works; to the Chairman and Directors of the

Union Steamship Company and to Captain Wait; to Dr. G. V. Poore; and to the Chairman and Committee of the Royal Southampton Yacht Club, and others, for having so kindly shown hospitality at private receptions, by privileges accorded to members, and at the various excursions, which have added so greatly to the pleasure and enjoyment of the meeting."

Proposed by Henry Law, M.Inst.C.E., seconded by G. J. Symons, F.R.S. :—

RESOLVED—"That the earnest thanks of the Congress are due to the Local General Committee, the various Sub-Committees and the Local Secretaries, for their arduous labours in their several departments, and for their unremitting exertions in carrying out the many details in the organisation of the Congress, which have culminated in such a successful meeting."

Proposed by W. Matthews, M.Inst.C.E., seconded by E. G. Mawbey, M.Inst.C.E. :—

RESOLVED—"That the thanks of this meeting are due to the members of the Press for the reports which have been published of the proceedings, and which are largely instrumental in the dissemination of the teachings of the Congress."

Proposed by Alderman T. Walton, J.P., seconded by Prof. W. H. Corfield, M.A., M.D. (Oxon):—

"That the cordial thanks of the Congress be hereby presented to the President, Sir William Henry Preece, K.C.B., F.R.S., for the interest and courtesy he has displayed in presiding over the Congress and attending the numerous meetings."

The President said in concluding his remarks upon the Congress that he hoped some permanent record and result of the meeting would remain in Southampton itself, and suggested that, as a fitting outcome of the large and successful meeting, a local sanitary association should be started in the town of Southampton. The local enthusiasm had shown that such an association would be well supported, and the continual working of a local society would probably effect more for Southampton itself than even a large meeting such as had just been held.

A most successful society of this kind was established after the Congress of the Institute held in Worcester, and has done and is doing a large work.

The Institute itself would be only too glad to welcome and to assist in any way such an undertaking.

The total number of Congress tickets issued was 1,691 (see report on page 490).

The President announced that the next Congress would be held in Nottingham, commencing August 21st, 1900.

SOUTHAMPTON EXHIBITION, 1899.—LIST OF AWARDS.

SILVER MEDALS.

Brown & Polson, 99, Queen Victoria Street, E.C.
Corn Flour for Invalids.
Burroughs, Wellcome & Co., Snow Hill Buildings, E.C.
Disinfecting Soloids.
Burt, Boulton & Haywood, 64, Cannon Street, E.C.
Products of Coal Tar and Ammoniacal Liquor.
Cadbury Brothers, Bournville, near Birmingham.
Cocoa.
F. C. Calvert & Co., Manchester.
Carbolic Acid Preparations.
Chalmers & Co., High Street, Redhill.
Van-shaped Ambulance.
J. Defries & Sons, Ltd., 147, Houndsditch, E.C.
Equifex Steam Disinfector.
W. Glover & Sons, Ltd., Eagle Works, Warwick.
Glover's Tipping Dust Van.
United Alkali Co., Ltd., Liverpool.
Chloros.
Webb's Engineering Co., Ltd., 11, Poultry, E.C.
Anti-Splash Excel Silver Nozzles.
Wilson & Stockall, County Works, Bury, Lancs.
Brougham Ambulance.

BRONZE MEDALS.

Aerators, Ltd., Broad Street Avenue, E.C.
Sparklets.
Robert Adams, 67, Newington Causeway, S.E.
The "Crown Victor" and "London Victor" Oil Check Spring Hinges.
Robert Adams, 67, Newington Causeway, S.E.
The "City" and "Cushion Victor" Pneumatic Silent Check Spring Hinges.
Robert Adams, 67, Newington Causeway, S.E.
The "E.R.A." Reversible Window Fittings.
Robert Adams, 67, Newington Causeway, S.E..
"X.I.T." Bolts.
Albion Clay Co., Ltd., Albion Works, Woodville, Burton-on-Trent.
Sykes' Access Pipes and Junctions.

ALBION CLAY CO., LTD., Albion Works, Woodville, Burton-on-Trent.
Sykes' Street Gully.
ALBION CLAY CO., LTD., Albion Works, Woodville, Burton-on-Trent.
"Accomo" Yard Gully.
ALIONE CO., 17, The Broadway, Norwood, S.E.
Sick Room Apparel.
ANDERSON PATENT PIPE COUPLING SYNDICATE, Clun House, Surrey Street, W.C.
Anderson's Pipe Coupling.
BOAKE, ROBERTS & CO., Stratford, E.
Liquid Sulphur Dioxide.
JOSEPH CLIFF & SONS, Baltic Wharf, Waterloo Bridge, S.E.
Shoppee's Dove-tailed Bricks.
JOSEPH CLIFF & SONS, Baltic Wharf, Waterloo Bridge, S.E.
Shepwood Partition Bricks.
JOSEPH CLIFF & SONS, Baltic Wharf, Waterloo Bridge, S.E.
Wyvurst's Channels.
JOSEPH CLIFF & SONS, Baltic Wharf, Waterloo Bridge, S.E.
Border's Glazed Stoneware Manholes.
DOULTON & CO., LTD., Lambeth.
"Compact" Wash-down Closet.
DOULTON & CO., LTD., Lambeth.
Vitreous Porcelain Enamelled Bath.
J. DUCKETT & SONS, LTD., Burnley, Lancs.
Latrine with Isolated Pans.
J. DUCKETT & SONS, LTD., Burnley, Lancs.
"Clencher" Wash-down Closet.
J. DUCKETT & SONS, LTD., Burnley, Lancs.
The "Rapid" Slop Water-closet.
THE HARD YORK PATENT STONE CO., Lightcliffe, near Halifax.
The "Nonslip" Hard York Stone.
HERBERT JAMES HOLT, Bevois Valley, Southampton.
Cullis and Beavan's Combined Sink Standard and Waste.
HERBERT JAMES HOLT, Bevois Valley, Southampton.
Ewart's Geyser.
HOOPER & ASHBY, Britannia Wharf, Southampton.
Callender's Pure Bitumen, for Linings.
HOOPER & ASHBY, Britannia Wharf, Southampton.
Barron's Channel Bends.
GEO. HOWSON & SONS, LTD., Eastwood Sanitary Works, Hanley.
White Enamelled Fireclay Wash-tubs.
GEO. HOWSON & SONS, LTD., Eastwood Sanitary Works, Hanley.
Combination Fireclay Sink, with Wash-board.
GEO. HOWSON & SONS, LTD., Eastwood Sanitary Works, Hanley.
Range of White Enamelled Urinals.
GEORGE JENNINGS, Lambeth Palace Road, S.E.
"Era" Valve Closet.
GEORGE JENNINGS, Lambeth Palace Road, S.E.
White Glazed Dorset Clay Channels.

GEORGE JENNINGS, Lambeth Palace Road, S.E.
Porcelaine Bath, with Duplex Supply Valves.
J. A. KING & Co., Blackwall Tunnel Wharf, Blackwall, E.
The "Mack" Patent Fireproof Plaster Slabs.
B. KUHN, 36, St. Mary-at-Hill, E.C.
Chinosol.
LOCKERBIE & WILKINSON, LTD., Exeter Street, Birmingham.
Abattoir Fittings.
OATES & GREEN, LTD., Halifax.
Salt-glazed Wash-tub and Rubber combined.
OATES & GREEN, LTD., Halifax.
Improved Glazed Stoneware Manger.
C. W. OUTRAM & Co., Woodville, Burton-on-Trent.
Aquarius Water-closet and Fittings.
PARKE, DAVIS & Co., 21, North Audley Street, W.
Anti-Diphtheria Serum of High Potency.
T. E. PECKETT, Rockhill Works, Wellington Street, Sheffield.
Combined Knife and Fork Cleaner.
G. A. PERMAIN & Co. 31, Above Bar, Southampton.
Inlaid Linoleum.
SANITARY LEAD LINING AND PIPE BENDING Co., Cremorne Wharf, Lots Road, Chelsea, S.W.
Lead Lined Iron Pipes.
W. SUMMERSCALES & SON, LTD., Phœnix Foundry, Keighley, Yorks.
Washing Machine for Disinfecting under Steam Pressure.
W. SUMMERSCALES & SON, LTD., Phœnix Foundry, Keighley, Yorks.
Improved "Challenge" Ironing Machine.
W. SUMMERSCALES & SON, LTD., Phœnix Foundry, Keighley, Yorks.
"Body" Ironing Machine.
R., J. & H. WILDER, Wallingford, Berks.
Wilder's Spring Tumbler Cart.

DEFERRED FOR PRACTICAL TRIAL.

ANTI-VIBRATION INCANDESCENT LIGHTING Co., 12 & 14, Westgate Arcade, Bradford.
Anti-Vibration Fittings.
H. BARRAND, 18, Thrum Hall Lane, Gibbet Street, Halifax.
Cascade Filter for Removing Lead from Water.
BRAND & Co., LTD., 74, South Lambeth Road, S.E.
Nutrient Powder.
JOSEPH CLIFF & SONS, Baltic Wharf, Waterloo Bridge, S.E.
Architectural Terra Cotta.
THE ENGLISH PAINTOFF Co., Clapham Common, S.W.
Paint-removing Compound.
THE FSYWOSH Co., LTD., Union Street, Plymouth.
"Mabin-Pett" Improved Perforated Fire Bar.
FORMALIN HYGIENIC Co., LTD., 9 & 10, St. Mary-at-Hill, E.C.
Alformant "B."

Formalin Hygienic Co., Ltd., 9 & 10, St. Mary-at-Hill, E.C.
Trillat's Autoclave.

T. G. Lyon, M.A., M.D., 1, Victoria Square, S.W.
Lyon-Cadet Ventilating Apparatus.

Parke, Davis & Co., 21, North Audley Street, W.
Beef Meal.

Alice Patchett, 3, Lime Villas, Green Lanes, Birmingham.
Mortar-testing Apparatus.

G. A. Permain & Co., 31, Above Bar, Southampton.
Kapok Vegetable Wool for Mattresses.

Reeves' Chemical Sanitation Co., Ltd., 17, Victoria Striet, S.W.
System of Sewer Deodorisation.

H. Rossell & Co., Ltd., Waverley Works, Sheffield.
Automatic Smoke Preventer.

Walter Sharratt, Tower Works, Clayton, Manchester.
Formaldehyde Regenerator.

Sissons Bros. & Co., Ltd., Hull.
Hall's Sanitary Washable Distemper.

Ernest Smith, 82, Coldharbour Lane, S.E.
Smith's Iron-jointed Stoneware Pipe.

C. J. Van Houten & Son, St. George's House, Eastcheap, E.C.
Cocoa.

Webb's Engineering Co., 11, Poultry, E.C.
Sewer Gas Extractor.

LETTER OF THANKS.

Southampton Corporation.
Sections and Systems of Sewers.

LOUIS C. PARKES, *Chairman of the Judges.*

REVIEWS OF BOOKS.

MODERN DRAINAGE INSPECTION AND SANITARY SURVEYS.*

The author has done well in publishing in convenient book form the very useful and practical papers which he has contributed from time to time to the "Sanitary Record." His work will be of equal value to students of sanitary science, and those who may require an *aide mémoire* in their daily duty as inspectors.

His introductory chapter is full of good sound matter, every word of which is valuable and should be laid to heart.

Then follows a brief description of the most reliable appliances used in drain testing. The next chapters, III. and IV., deal with the manner of inspecting the interior and the exterior of a house; both chapters are well illustrated and contain many useful hints.

The next chapter is devoted to drain testing, a subject which is often imperfectly understood, even by those whose duty it is to examine drains, the evident practical knowledge of the writer marks the work as a reliable guide.

Other chapters and appendices follow and bring to a conclusion a work which is full of value to all who are interested in sanitation, and will take its place in the fore-front of the many books which have been published on the subject, while the simplicity of its verbiage, as well as the modest price of the book, should secure for it a large share of patronage, and we heartily recommend the work.

L. F.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions.
Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

Science in relation to Hygiene and Preventive Medicine.

RICHMOND, H. DROOP and C. H. ROSIER. The Estimation of Fat in Milk; Using Petroleum Ether as a Solvent. *The Analyst*, July, 1899, p. 172.

Showing the superior qualities of petroleum ether as a solvent of fats over those of methylated ether.

* By Gerald J. G. Jensen, Pp. 126. 112 Illustrations. London. *The Sanitary Publishing Co., Ltd.* Price 2s. 6d. net.

BONJEAN, M. ED. Le Bacille Pyocyanique dans les Eaux d'Alimentation. *Revue d'Hygiène Publique*, July, 1899, p. 28.

Concludes that the presence of the *Bacillus pyocyaneus* in drinking water is condemnatory of it. The methods of detecting the bacillus and of applying the pigmentary test are given.

MM. BROUARDEL, P., et GRANCHER. Les Sanatoriums et leurs Variétés Nécessaires. *Annales d'Hygiène Publique*, July, 1899, p. 5.

Criticises the statistics of recovery in German and other Sanatoria for Phthisis. Emphasises the fact that in the adult the recovery from phthisis, even in a sanatorium, is very slow and difficult.

MAHON, R. B., M.D., F.R.C.S. The Causes and Management of Outbreaks of Typhus Fever in Rural Districts. *The Journal of State Medicine*, July, 1899, p. 394.

Sufficiently indicated in title.

Hygiene of Special Classes Trades and Professions and Municipal Administration.

"BUILDER." A Description of the Designs for the Royal Infirmary Competition, Newcastle-on-Tyne. *The Builder*, August 12, 1899, p. 147.

A critical examination of the designs.

ROYAL INSTITUTE OF BRITISH ARCHITECTS, SPECIAL COMMITTEE OF THE. Report of the Special Committee on Building Bye-Laws in Non-Metropolitan Districts. *Journal of the Royal Institute of British Architects*, June 17, 1899, p. 449.

Report and discussion.

FOSTER, E. Public Baths. *The Surveyor*, July 14, 1899, p, 37.

Provision of public baths the duty of municipal authority. Extracts from report of the Borough Engineer of Cardiff as to baths for the town. General description of baths, heating, lavatories, &c.

Water Supply, Sewerage and Refuse Disposal.

PEIRCE, W. G. Water: Auxiliary Town Supplies. *The Surveyor*, July 14, 1899, p. 46.

Economising domestic supply by separate sea-water system. Calcutta water. The dual supply system at Richmond from the river Thames. Details for water mains.

PICKERING, RICHARD. Water supplies to the Incorporated Boroughs and the Urban and Rural Districts of West Cumberland. *The Surveyor*, June 23, 1899, pp. 811-12.

Physical aspects of county Acts of Parliament relating to water schemes. Description of waterworks at Workington, Cockermouth, Maryport, Millom, Arlecton and Frizington, and Bootle.

FULLER, GEORGE W., ASSOC.M.AM.SOC.C.E. The Present Status of Water Filtration. *Engineering Record*, May 27, p. 593.

Difficulty of filtration of turbid water through sand. English system. Use of coagulating chemicals, such as:—(i.) Sulphate of alumina. Its chemical action on turbid water. Subsequent filtration. (ii.) Treatment with lime-water. Precipitation of coarser materials and subsequent rapid filtration of effluent.

KEMNA, DR. AD. The Biology of Sand Filtration. *The Surveyor*, June 30, 1899, p. 842-4.

Importance of modern water supply. Early sand filters and their results. Action on microbes. Cholera of 1892, and experiments at Hamburg. Animal and vegetable matter. Biology of sand filtration.

BRACKETT, DEXTER. Scraping Water Mains, Boston, Mass. *Engineering Record*, 17 June, 1899, page 51.

Mains in Boston (1848 to 1868) had internal coating of "tubercles" $\frac{3}{4}$ths to $1\frac{1}{4}$ ins. thick. Method of removal, resulting in more than doubling discharging capacity.

READ, R., A.M.I.C.E. The Ventilation of Sewers and Drains. *The Surveyor*, June 30, 1899, pp. 862-3.

Difficulties of sewer ventilation. Experiments by leading engineers. Surface ventilation. Ventilation by factory chimneys. Upcast shafts. Intercepting traps. Ventilation of the Gloucester sewers.

Heating, Lighting, and Ventilating.

BOYLE, ROBERT. Natural Ventilation (I. & II.) *The Building News*. August 4th and 11th, 1899, pp. 124-5 and 159.

Diversity of opinion on ventilation. Incessant movement of air a law of nature. Composition of atmospheric air. Statistics as to respiration. Heating to be separate from ventilation. Upward and downward ventilation.

Scientific system of natural ventilation. Advantages, &c., of a natural system.

FOULIS, WM. Residual Products from Gas Purification. *Engineering*, June 23, 1899, p. 832

Notes on the recovery of residual products from coal gas during process of purification.

"THE BUILDER," EDITOR OF. The Smoke Nuisance. *The Builder*. August 12, 1899, p. 143.

Advocating adoption of better fire-grates, &c.

Personal and Domestic Hygiene.

ROSENHEIM, OTTO, PH.D., and SCHIDROWITZ, PHILIP, PH.D. Comparative Analyses of, and Digestion Experiments with, White and Whole Meal Breads. *The Analyst*, September, 1899, p. 227.

Gives the results of experiments to test the relative digestibility of white and whole meal breads and the nutritive value and wholesomeness of the two. The whole-meal breads were found to contain considerably more ash, phosphoric acid, and soluble matter than the white article, but, contrary to what is generally believed, the nitrogenous constituents are practically the same.

WATKINS, W., F.R.I.B.A. Domestic Sanitation. *The Builder*, August 4, 1899, p. 153.

A paper read before the Sanitary Inspectors' Association at Lincoln.

NOTES ON BOOKS AND PAPERS IN TRANSACTIONS.

The Institution of Civil Engineers, Minutes of Proceedings of. Vol. CXXXIV., Part IV. 1897–98.

Among "Abstracts of Papers in Scientific Transactions and Periodicals" are—

The Drainage of the Southern Portion of the Province of Buenos Ayres, by A. Etcheverry (La Ingienieria, Buenos Ayres, 1897, pp. 2 & 34.

The Water-carriage System in France, J. Stübben (Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, 1898, pp. 340 and 744).

Sewage Filtration at Winsford, Cheshire (The Engineer, 17th June, 1898, p. 567).

The Sewerage of Mulhausen, H. Greener (Bulletin de la Société Industrielle de Mulhouse, June–July, 1898, p. 168.

The Outbreak of Typhoid Fever at Beuthen (Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, 1898, p. 241).

Smoke-abatement in Paris: Report of the Technical Commission, Hirch (Revue de Mécanique, 1898, pp. 337, 605, *et seq.*)

Dangers to the Health of Operatives engaged in the Gun-cotton Manufacture, Robert Voght (Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, 1898, p. 566).

Electrolysed Sea-water for Disinfecting, W. L. Hedenberg (The Electrical Engineer, Vol, XXI., p. 681; also Electricity, New York, Vol. XIV., 1898, p. 296).

Sterilisation of Water by Ozone, E. Andréote (L'Electricien, Vol. XV., p. 226).

Vol. CXXXV., Part I. 1898–99.

Among "Other Selected Papers," Section II., will be found a paper, "Karachi Sewerage Works," by James Strachan, C.I.E., M.Inst.C.E.

Among the "Abstracts of Papers in Scientific Transactions and Periodicals" are—

Hygienic Regulations for Workers in Compressed Air, L. Brennecke (Centralblatt der Bauverwaltung, 1898, p. 305).

The Significance of Subsoil Water, E. Prinz (Gesundheits-Ingenieur, 15th October, 1898, p. 320).

The Purification and Sterilisation of Drinking-water, Henri Bergé (Annales des Travaux publics de Belgique, 1898, p. 369).

The Removal of House Refuse on the Kinsbruner System, Walter Häntzschel (Gesundheits-Ingenieur, 31st October, 1898, p. 329).

The Disinfection of Dwellings by means of Formic Aldehyde, Dr. Symanski (Zeitschrift für Hygiene, Vol. XXVIII., Part 2, p. 219).

Acetylene Gas from the Hygienic point of view, Joseph Vértess (Gesundheits-Ingenieur, 31st July, 1898, p. 225.

Vol. CXXXVI., Part II. 1898–99.

In Sect. I., "Minutes of Proceedings," there is a paper, with discussion, on "The Ventilation of Tunnels and Buildings," by Francis Fox, M.Inst.C.E.

Among the "Abstracts of Papers in Scientific Transactions and Periodicals" are—

Water-storage in Mexico (Organ des Verein der Bohrtechniker, 1st September, 1898, p. 8).

The Bergé Process of Purifying Drinking-water, by H. E. P. Cottrell, Assoc.M.Inst.C.E. (Engineering, 16th December, 1898, p. 767).

MEETINGS HELD JULY TO SEPTEMBER, 1899.

Congress.

The Eighteenth Congress and Exhibition of the Institute was held at Southampton from August 29th to September 2nd by invitation of the Mayor and Corporation.

Very suitable accommodation was provided for the meetings of the Congress in the Hartley Institution, Municipal Offices, and the King Edward VI. Grammar School, and excellent arrangements were made for the reception and convenience of members. The Exhibition was held in the Victoria Hall and Royal Victoria Rooms.

The Congress was received by the Mayor (Councillor G. A. E. Hussey), and his speech of welcome was responded to by Mr. Henry Law, Chairman of Council, on behalf of the Institute; Major Lamorock Flower, Chairman of Congress Committee, on behalf of the Congress; and Sir William Pink, J.P., on behalf of the Delegates from Local Authorities.

A Public Luncheon was held in the Pavilion, Royal Pier, at which the Mayor presided, and the following toasts were proposed:—

The Queen, by the Chairman, The Worshipful The Mayor.

The Sanitary Institute, by The Mayor.

Responded to by Mr. Henry Law.

The Mayor and Corporation, by Sir William Henry Preece, K.C.B., F.R.S.

Responded to by The Mayor.

The first General Meeting was held on September 29th. Sir Wm. Henry Preece, K.C.B., F.R.S., was installed as President of the Congress by Mr. Henry Law, Chairman of Council, and delivered his Inaugural Address.

The Mayor formally opened the Exhibition in the evening.

The business of the Congress was divided into three Sections, and eight Special Conferences were held. Particulars of these are given in the programme of the Congress in Part II. of the Journal. During the Congress 93 addresses, lectures, and papers were read, and the business was divided into 19 meetings. The Presidents' Addresses are published in the present number of the Journal. The papers read in the Sectional Meetings, with the discussions upon them will be published in Part IV. of

[redacted]

the present volume, and an abstract of the proceedings of the Conferences will be given in Part I. of Vol. XXI.

During the meeting excursions were made to Osborne House, New Forest, round the Isle of Wight, Netley Castle, Netley Hospital, Waterworks at Otterbourne, Sewage and Refuse Disposal Works, Isolation Hospital, Dr. Poore's Garden at Andover, Union Steamship Company's S. S. "Scot," Electric Supply Station, at which places the members were most hospitably entertained by Lady Emma Crichton, Surg.-Gen. Nash and Officers of the Royal Army Medical Corps, Dr. G. V. Poore, Directors of South Western Railway, Union Steamship Co., Alderman J. Lemon, Alderman T. Walton, J.P., Alderman W. Bone, J.P., W. B. G. Bennett, Borough Engineer.

A number of Archæological and Cycle Excursions were also arranged.

The numbers attending the Congress were as follows:—Delegates, 910; Members and Associates of the Institute, 370; Associates of the Congress and Subscribers, 411—making a total of 1,691. About 500 ladies accompanied the Members and Delegates, which make the total number attending the meeting over 2,000.

Delegates were appointed by 450 Sanitary Authorities and learned Institutions.

EXAMINATIONS.

From July to September the following Examinations were held:—

PRACTICAL SANITARY SCIENCE.

July 7th & 8th, Cardiff.	1 Candidate,	1 Certificate granted.
„ 28th „ 29th, Liverpool.	3 Candidates,	2 Certificates granted.

INSPECTORS OF NUISANCES.

July 7th & 8th, Cardiff.	29 Candidates,	17 Certificates granted.
„ 28th „ 29th, Liverpool,	74 „	37 „ „

The following list gives the names of the Candidates to whom Certificates were granted:—

Practical Sanitary Science.

1899, July 29. CHEETHAM, AUGUSTUS ERNEST, 70, Church Road, Urmston, Manchester.

1899, July 29. OWEN, JOHN RICHARD, 21, Herbert Street, Moss Side, Manchester.

1899, July 8. PUGH-JONES, DAVID, Grongar House, Llandaff.

Inspectors of Nuisances.

1899, July 8. ATKINSON, HENRY, 81, New Park Street, Salford, Manchester.
1899, July 29. *L* BARTON, Miss ELEANOR CONSTANCE, Chelsea Infirmary, South Kensington, S.W.
1899, July 29. BAXTER, JAMES, Whiston, near Prescot.
1899, July 29. BENNETT, ARTHUR, 7, Wellington Street, Burslem.
1899, July 29. *L* BIRRELL, Miss ISABELLA, 53, Grove Road, Rock Ferry, Cheshire.
1899, July 29. BOOL, THOMAS EDWARD, 34, Rawmarsh Hill, Parkgate, Rotherham.
1899, July 29. BOYDELL, EDWARD, 99, Walton Lane, Kirkdale, Liverpool.
1899, July 8. BROCKS, WALTER WILLIAM, Stoke Bishop, near Bristol.
1899, July 29. CLARKE, WILLIAM, 8, Tattersall Street, Werneth, Oldham.
1899, July 29. CLAYTON, FRED, Newlands, Rastrick, Yorks.
1899, July 8. CORNISH, GEORGE, 12, Wellington Street, Stoke, Devonport.
1899, July 29. COTTERELL, JOHN, 6, Oakwood St., West Bromwich.
1899, July 8. DAVIES, JOSHUA, 1, Pyke Street, Barry Dock.
1899, July 8. DAVIES, LEWIS THOMAS, 12, Edward Street, Porth, Rhondda.
1899, July 8. EVANS, GEORGE DAVIES, Donyrallt House, Pentre R.S.O.
1899, July 29. EWART, JOHN WALTER, Craig House, Keswick, Cumberland.
1899, July 29. FRYER, STEPHEN S. P., 28, Elphinstone Road, Hastings.
1899, July 8. GARSIDE, HERBERT JACKSON FIRTH, Torbay College, Torquay.
1899, July 29. GRAY, WILLIAM ARTHUR, Raws Terrace, Wyke, Bradford.
1899, July 8. HARRIES, GRIFFITH, 66, Bailey Street, Tonpentre.
1899, July 29. HEAD, JOSEPH, 5, Regent Street, Hinckley, Leicester.
1899, July 8. HENDERSON, STANLEY ROBERT, 70, Neville Street, Cardiff.
1899, July 29. HIGGINSON, JOHN, 69, Auburn Street, Bolton.
1899, July 29. *L* HITCHMOUGH, Miss EDITH MARY, 175, Kingsley Road, Liverpool.
1899, July 29. HOLDEN, RALPH, 7, Meadow Lane, Blackburn..
1899, July 29. HOPKINS, HENRY ROBERT, 7, Lambart Terrace, Ashburnham Road, Greenwich, S.E.
1899, July 8. JONES, DANIEL WILLIAM, Brondeg Cottage, Cwmpare, Treorky, Glamorgan.
1899, July 8. JONES, DAVID JAMES, 12, Alma Street, Treherbert.
1899, July 29. LAMB, THOMAS BAXTER, 3, Morecambe Street, Morecambe.

1899, July 8. MANDERS, EDWARD JOHN, 14, Wyndham Road, Canton, Cardiff.
1899, July 29. MARLOR, ARTHUR WILLIAM, 29, Wilton Street, Denton, Manchester.
1899, July 29. MARSHALL, ALFRED GRAHAM, 27, Broughton Lane, Manchester.
1899, July 29. MIDDLETON, ERNEST, 10, Blythe Street, Wombwell, near Barnsley.
1899, July 29. NEWTON, JOHN WILLIAM, 13, Manwaring Street, Failsworth, Manchester.
1899, July 29. *L* O'BRIEN, Miss EDITH FLORENCE, 60, Upper Parliament Street, Liverpool.
1899, July 29. OWEN, OWEN, 58, Devonshire Place, Liverpool.
1899, July 8. PHILLIPS, DAVID, 23, Regent St., Treorky, Rhondda.
1899, July 29. PICKIN, WILLIAM HENRY, Sewerage Works Office, Berkhamstead.
1899, July 29. POLLARD, FRED, 44, Graver Lane, Newton Heath, Manchester.
1899, July 8. ROCH, DAVID DUNDAS, Mount Pleasant, Milford Haven.
1899, July 8. ROCHE, WILLIAM, 145, Penarth Road, Cardiff.
1899, July 29. SIMMONS, THOMAS BURTHAM, Thornton Rd., Bootle, Liverpool.
1899, July 29. SMETHURST, ROBERT ALEXANDER, 4, William Street, Beech Avenue, Urmston, near Manchester.
1899, July 29. *L* SMITH, Miss ANNIE ISABELLA, 50, St. Domingo Vale, Liverpool.
1899, July 29. STUART, FRANK DONALD, Bromsgrove Rural District Council Offices, Bromsgrove.
1899, July 29. SUMNER, EVAN, 17, St. Helens Road, Bolton.
1899, July 29. SWAINSON, JOHN WALKER, 40, Edge Lane, Liverpool.
1899, July 29. TOPPING, HERBERT, 94, Nelson St., Fishpool, Bury.
1899, July 29. WARWICK, WILLIAM ATKINSON, 4, Lorn Street, Birkenhead.
1899, July 29. WEST, ROBERT DICKSON, 27, West Blackhall Street, Greenock.
1899, July 8. WILLIAMS, MARK POLLOCK, 1, Coedcae St., Grange, Cardiff.
1899, July 29. WILLIAMSON, ANDREW, 21, Mitylene St., Liverpool.
1899, July 29. WOODLEY, BEN, Thorne, near Doncaster.
1899, July 8. YOUNG, THOMAS DUNLOP, 19, Quadrant Road, Canonbury, N.

Examination Questions.

Practical Sanitary Science.—Cardiff, July 7th and 8th, 1899.

PAPER I.

1. What is the essential difference between a chemical compound and a mechanical mixture? What is the composition of air and of water, and under which head would each come?

2. What effect has humidity upon determining the healthiness or otherwise of a locality? How is it estimated and how is it expressed?

3. Contrast the composition of ground air with that of the general atmosphere. What diseases have been attributed to ground air?

4. A drinking water supply is exposed to intermittent pollution. Discuss the value of the measures which may be taken with regard to collection, filtration, and storage, in order to protect the health of the consumers, and to guard against water-borne disease.

PAPER II.

5. Specify the various materials suitable for covering the walls and floors of an Infectious Diseases Hospital, state the way in which they should be used, and discuss their relative merits.

6. What are the forces concerned in natural ventilation? What part does temperature play in determining the velocity of air currents?

7. What are borrowed lights, and what are their advantages and disadvantages in a building? What is the best position for an outlet for foul air from a living room? Sketch an Arnot mica flap ventilator.

8. Under what conditions would you apply the following tests to house drains?

1. Water,
2. Smoke under pressure,

and explain how you would proceed to carry out each test.

The Candidates were examined vivâ voce *on the 8th.*

Practical Sanitary Science.—Liverpool, July 28th and 29th, 1899.

PAPER I.

1. How is a barometer constructed, and how does it indicate the atmospheric pressure? What errors are likely to affect the readings, and how can these be corrected? State in detail how you would take a Standard barometer reading and apply the necessary corrections.

2. Explain the action of a Siphon and describe the construction and use of a Siphon Flushing Tank.

3. How is "pressure" related to "head" of water? What dimensions of a cistern affect the pressure in the pipes from it? What is the effect of an air lock in a supply pipe?

4. What are the modes in which heat is transmitted, and what is the effect of heat on gases, liquids, and solids? Give the formula for the relation between the pressure, volume, and temperature of a gas, and apply this to explain the influence of a fire on the ventilation of a room.

PAPER II.

5. Describe fully the construction of an economical fire grate. Sketch a plan and section of a warm air grate and a simple slow combustion grate.

6. Describe, with sketch, an ordinary arrangement of hot water supply from kitchen to scullery, bathroom, and lavatory.

7. Under what conditions are traps upon waste pipes desirable, and where should they be placed? Give a sketch showing the waste from a bath discharging over a gulley 12ft. distant, and mark the sizes of the pipes.

8. What do you understand by the biological treatment of sewage? What conditions are necessary if this method of sewage disposal is adopted?

The Candidates were examined vivâ voce *on the 29th.*

Inspectors of Nuisances.—Cardiff, July 7th and 8th, 1899.

1. By whom and by virtue of what legislative enactment is a Port Sanitary Authority constituted? Explain the special powers and duties of the offices of such authority in the case of a vessel putting into port with a case of dangerous infectious disease on board, *e.g.*, Plague.

2. What are the sanitary requirements of a cowshed and of a bakehouse? Indicate the statutory provisions which enable such requirements to be enforced.

3. What are the differences in appearance and composition between river, spring, and rain water?

4. What are the requirements of a good water filter for domestic uses? How does a Charcoal filter and a Pasteur filter meet these requirements?

5. Indicate in what ways and in what proportions the following agents must be employed for disinfecting the surfaces of a room with a floor area of 124 square feet and a height of 14 feet:—

Sulphurous acid.
Chlorine.
Formic aldehyde.

6. A house drain having just been laid, describe the points to which you would give attention in making an inspection. What tests would you apply?

7. How may water traps be unsealed by siphonage, and in what ways may this danger be guarded against?

8. Describe the qualities and composition of good brickwork, concrete, and mortar.

The Candidates were examined vivâ voce *on the 8th.*

Inspectors of Nuisances.—Liverpool, July 28th and 29th, 1899.

1. What are the characteristics of good meat? How would you distinguish the carcase of a bull from that of an ox or a heifer?

2. What facts should be ascertained on visiting a case of Diphtheria which has been notified? If the case is nursed at home what precautions should be taken to guard against the spread of the disease?

3. Indicate the relative efficiency of disinfecting bedding by means of (*a*) hot air, (*b*) superheated steam, (*c*) saturated steam. What temperature and period of exposure would be necessary in each case?

4. What relation has cubic space to fresh air supply? What amount of cubic space is required by the provisions of the Factory and Workshops Act, 1895, the model By Laws issued by the Local Government Board dealing with Common Lodging Houses, and the Canal Boats Act, 1877.

5. What are the cubic contents of a galvanized iron shed 30 ft. long, 15 ft. wide, 7 ft. high to the eaves with a semicircular roof?

6. Describe and sketch a good form of sink to receive bedroom slops; a good form of water-closet pan and trap other than one of "wash down" type.

7. If the bottom of a soil pipe becomes blocked what will be the effect of its filling with liquid? What is an air lock in a pipe? What is the difference between a valve and a trap?

8. Why is a greater fall required for a drain of small diameter than for one of large diameter? Sketch how you would lay a drain 50 ft. long from a house 20 ft. above the sewer.

The Candidates were examined viva voce on the 29th.

FORTHCOMING MEETINGS.

CALENDAR, OCTOBER TO DECEMBER, 1899.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesda[illegible] [illegible] at 5 p.m. except August and September.

[illegible] Committee .	. Third Monday at 5 p.m.
[illegible] Committee . .	. Second Wednesday at 4.30 p[illegible]
[illegible] Committee . .	. First Monday at 5 p.m.
[illegible] Committee	. Second Monday at 5 p.m.
[illegible] Committee	. Fourth Monday at 5 p.m. [illegible]cept December).
[illegible] Committee .	. Fourth Thursday in Oct. 5 p[illegible]
[illegible] Committee .	As occasion requires.
[illegible] Committee .	

SEPTEMBER

[illegible]	[illegible]	[illegible] Laws of Motion, &c.	John Castell-Ev[illegible] F.I.C., Lecturer [illegible] Inorganic Chemi[illegible] & Chemical Phy[illegible] at the City & Gu[illegible] of London Techni[illegible] College, Finsbur[illegible]
[illegible]	[illegible]	[illegible] Heat, Electricity.	
[illegible]	[illegible]	The Atmosphere, Pressure and Composition.	
[illegible]	[illegible]	[illegible] & Respiration	
[illegible]	[illegible]	[illegible] & Purification.	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	

OCTOBER

[illegible] Lecture to Sanitary Officers at [illegible] p.m. Elementary Statistics, [illegible] D.P.H.LOND. & CAMB.

[illegible] Lecture to Sanitary Officers at [illegible] p.m. Sanitary Law—English, Scot[illegible] and [illegible] Public Health Act, 1875; Mo[illegible] By-Laws, [illegible] Herbert Manley, M.A.CANTAB., M.B., D.P.H., Medi[illegible] [illegible] West Bromwich.

6 F. Lecture to Sanitary Officers at 8 p.m. Public Health Statutes; Orders Memoranda, and Model By-Laws of the Local Government Board, and By-Laws in Force in the Administrative County of London, by F. J. Waldo, M.A., M.D., D.P.H., Barrister-at-Law, Medical Officer of Health, St. George-the-Martyr, and Inner and Middle Temple.
7 S. Inspection and Demonstration at Wimbledon Sewage Works, at 3 3 p.m., conducted by C. H. Cooper, M.INST.C.E., Engineer and Surveyor to District Council.
9 M. Lecture to Sanitary Officers at 8 p.m. Objects and Methods of Inspection, Nuisances, &c., by J. F. J. Sykes, D.SC., M.D., Lecturer on Public Health, Guy's Hospital, Med. Officer of Health, St. Pancras.
11 W. Inspection and Demonstration in the Parish of St. George, Hanover Square, at 2 p.m. (number limited), conducted by Albert Taylor, Chief Sanitary Inspector.
11 W. Lecture to Sanitary Officers at 8 p.m. Trade Nuisances, by Prof. A. Bostock Hill, M.D., D.P.H.CAMB., F.I.C., Queen's Professor of Hygiene and Public Health, Mason's University College, Birmingham, Med. Officer of Health, Sutton-Coldfield, &c.
13 F. Lecture to Sanitary Officers at 8 p.m. Infectious Diseases, by Henry R. Kenwood, M.B., D.P.H., F.C.S., Assist. Professor of Hygiene, University College, Medical Officer of Health, Stoke Newington.
14 W. Inspection and Demonstration at Morden Hall Farm, Morden, Surrey, at 3 p.m.
16 M. Lecture to Sanitary Officers at 8 p.m. Methods of Disinfection, by Henry R. Kenwood, M.B., D.P.H., F.C.S., Assist. Professor of Hygiene, University College, Medical Officer of Health, Stoke Newington.
18 W. Inspection and Demonstration of Disinfecting Apparatus and Model Steam Laundry at St. John's Wharf, Fulham, at 3.30 p.m., conducted by W. G. Lacy.
18 W. Lecture to Sanitary Officers at 8 p.m. Calculations, Measurements, and Plans and Sections, by Henry Law, M.INST.C.E.
20 F. Lecture to Sanitary Officers at 8 p.m. Ventilation, Warming, and Lighting, by Joseph Priestley, B.A., M.D., M.R.C.S., D.P.H.CAMB., Med. Officer of Health, Lambeth.
21 S. Inspection and Demonstration at the Southwark and Vauxhall Water Works, Hampton, at about 3 p.m.
23 M. Lecture to Sanitary Officers at 8 p.m. Water Supply, Drinking Water, Pollution of Water, by Louis Parkes, M.D., D.P.H., Lecturer on Public Health, St. George's Hospital, Medical Officer of Health, Chelsea.
25 W. Inspection and Demonstration at East London Soap Works, Bow, E., at 3 p.m. E. Cook & Co.
25 W. Lecture to Sanitary Officers at 8 p.m. Building Materials, by H. D. Searles Wood, F.R.I.B.A.
27 F. Lecture to Sanitary Officers at 8 p.m. Sanitary Building Construction, by Percival Gordon Smith, F.R.I.B.A.
28 S. Inspection and Demonstration at the Richmond Main Drainage Works, Mortlake, Surrey, at 3 p.m., conducted by William Fairley, ASSOC. M.INST.C.E.
30 M. Lecture to Sanitary Officers at 8 p.m. Sanitary Appliances, by Geo. Reid, M.D., D.P.H., Med. Officer of Health, Staffordsh. County Council.

NOVEMBER.

1 W. Inspection and Demonstration in the Parish of St. George, Hanover Square, at 2 p.m. (number limited), conducted by Albert Taylor, Chief Sanitary Inspector.
1 W. Lecture to Sanitary Officers at 8 p.m. Details of Plumbers' Work, by J. Wright Clarke.
3 F. Lecture to Sanitary Officers at 8 p.m. House Drainage, by W. C. Tyndale, M.INST.C.E.

4 S. Inspection and Demonstration.
6 M. Lecture to Sanitary Officers at 8 p.m. Scavenging, Disposal of House Refuse, by Charles Jones, M.INST.C.E., Engineer and Surveyor, Ealing Urban District Council.
8 W. Inspection and Demonstration at Common Lodging House.
8 W. Lecture to Sanitary Officers at 8 p.m. Sewerage and Sewage Disposal, by Prof. Henry Robinson, M.INST.C.E.
9 Th. Demonstration of Book-keeping as carried out in a Sanitary Inspector's Office, in the Parkes Museum at 8 p.m., by Albert Taylor, Chief Sanitary Inspector, St. George's, Hanover Square.
10 F. } 11 S. } Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Newcastle-upon-Tyne.
10 F. Lecture to Sanitary Officers at 8 p.m. The Practical Duties of a Sanitary Inspector, by Reginald Dudfield, M.A., M.B., D.P.H., Medical Officer of Health, Paddington.
11 S. Inspection and Demonstration at the Sewage and Destructor Works, Ealing, at 2.15 p.m., conducted by Chas. Jones, M.INST.C.E., Engineer and Surveyor to the District Council.
13 M. Lecture to Sanitary Officers at 8 p.m. The Sanitary Inspector in relation to the Public Health Service, by Sir Richard Thorne Thorne, K.C.B., M.D., F.R.C.P., F.R.S.
15 W. Lecture to Sanitary Officers at 8 p.m. Signs of Health and Disease in Animals destined for Food, when alive and after slaughter; Tuberculin and other Tests, by W. Hunting, F.R.C.V.S.
17 F. Lecture to Sanitary Officers at 8 p.m. The Names and Situations of the Organs of the Body in Animals, by W. Hunting, F.R.C.V.S.
18 S. Inspection and Demonstration at St. Marylebone Stone Yard, 3 p.m.
20 M. Inspection and Demonstration at the Metropolitan Cattle Market, York Road, N., conducted by W. A. Bond, M.A., M.D., D.P.H., 3 p.m.
20 M. Lecture to Sanitary Officers at 8 p.m. The Appearance and Character of Fresh Meat, Organs, Fat, Blood, Fish, Poultry, Milk, Fruit, Vegetables, and other food, and the conditions rendering them, or preparations of them, fit or unfit for human consumption, by Alfred Hill, M.D., F.R.S.E., F.I.C., Medical Officer of Health, Birmingham.
22 W. Lecture to Sanitary Officers at 8 p.m. Diseased Meat, with a Demonstration of Morbid Specimens collected from Meat Markets, by W. A. Bond, M.A., M.D., D.P.H., Medical Officer of Health, Holborn, and St. Olave's, Southwark.
24 F. Lecture to Sanitary Officers at 8 p.m. The Hygiene of Byres, Lairs, Cowsheds, and Slaughter-houses, and all places where animals destined for the supply of food are kept, and the Hygiene of Markets, Dairies, and other places where food is stored, prepared, or exposed for sale, and transported, by E. W. Hope, D.SC., M.D., Medical Officer of Health, Liverpool.
27 M. Lecture to Sanitary Officers at 8 p.m. Practical Methods of Stalling and Slaughtering Animals, Preserving and Storing Meat and other foods.
29 W. Lecture to Sanitary Officers at 8 p.m. The Laws, By-Laws, and Regulations affecting the Inspection and Sale of Meat and other articles of food, including their preparation and adulteration, by W. A. Bond, M.A., M.D., D.P.H., Medical Officer of Health, Holborn, and St. Olave's, Southwark.

DECEMBER.

1 F. } 2 S. } Examinations in Practical Sanitary Science and for Inspectors of Nuisances, London.
13 W. **Sessional Meeting at 8 p.m.**
15 F. } 16 S. } Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Manchester.

NEW EXAMINATIONS.

Two additional examinations have recently been established by the Institute. The dates on which they will be held are given in Part II., page 306. The syllabus of the examinations is given on the following pages:—

Examination for Inspectors of Meats and other Foods.

SYLLABUS OF SUBJECTS.

A know ledge of the laws, by-laws, and regulations affecting the inspection and sale of meat and other articles of food, including their preparation and adulteration.

Signs of health and disease in animals destined for food, when alive and after slaughter.

Tuberculin and other tests.

The names and situations of the organs of the body in animals.

The distinctions between the parts and visceral organs in different domestic animals.

Size, weight, and form of the organs of ox, cow, horse, sheep, calf, pig.

Position of lymphatic glands.

The appearance and character of fresh meat, organs, fat, blood, fish, poultry, milk, fruit, vegetables, and other food, and the conditions tendering them, or preparations of them, fit or unfit for human consumption.

The Hygiene of byres, lairs, cowsheds, and slaughter houses, and all places where animals destined for the supply of food are kept.

The hygiene of markets, dairies, and other places where food is stored, prepared, or exposed for sale.

Practical methods of stalling and slaughtering animals, preserving and storing meat and other foods.

EXAMINATION IN PRACTICAL HYGIENE FOR SCHOOL TEACHERS.

The Comprehensive study of hygiene in its bearing on school life being almost new ground, it has been thought desirable to set out a syllabus in detail, in order to show the wide scope that it covers, and the co-relation of its several branches to other forms of educational work. It is set out in double columns, showing the relation of hygiene to the growth and surroundings of the child, and to emphasize the fact that hygiene should permeate the whole of school life, and not be merely treated as an independent study.

SYLLABUS.

The following syllabus is so set out as to induce thought and inductive reasoning.

Where possible, the students must prove that their knowledge is acquired from actual experience or from models and good diagrams, and not solely derived from laboratory work, letterpress, or from written or verbal instruction.

The verification of book knowledge by personal observation will be tested wherever practicable.

As personal hygiene, including that of school life, consists of the observance of health laws, in the immediate surroundings of the individual, students are advised to seek illustration from their own homes, from schools, and from the children with whom they are personally acquainted, remembering, however, that while generalisation can only be made on a large number of individual instances, hygiene consists in carrying out general principles in individual cases.

PART I.

PERSONAL HYGIENE, INDIVIDUAL AND SOCIAL, INCLUDING THE NECESSARY PHYSIOLOGY.

The student must show an elementary though sufficient acquaintance with:—

PHYSIOLOGY.

The Skeleton.	
Composition of Bone.	Food supply to bone.
Cranium.	Development.
Spine.—Chest.	Growth of spine in school hours. (*a*), (*b*). (*c*), (*d*).
Arms.—Hands.—Legs.—Feet.	Effect of exercise upon development; the value of proper development.
Muscles.	
The composition and uses of the chief muscles and tendons.	Their growth by exercise.
Nervous System.	Its development by use. The working hours of the brain. (*e*).
Brain.	
Spinal Cord.	Foods and stimulants for the nervous system.
Sensory Nerves.	
Motor Nerves.	Results of immoderate smoking.
Reflex action.	Formation of habits to conserve the strength of nervous system.
	Unstable conditions about the time of puberty.
The Heart and Blood Vessels.	
Structure and Purpose.	Wise exercise without strain.
Circulation of Blood.	
How it is affected and the objects achieved by it.	

(*a*) Some of the Laws which influence the growth of the Child. Trans. Hygiene and Demography. Vol. IV., pp. 103 to 108. Dr. Arbuthnott Lane.

(*b*) Postures in School. Health Exhibition Literature. Part II., pp. 449 to 459. Noble Smith.

(*c*) Handwriting in relation to Hygiene. Trans. Hygiene and Demography. Vol. IV., p. 47. Jackson.

(*d*) School Hygiene in its Mental, Moral and Physical Aspects. Journal of Statistical Society, Sept., 1897, p. 613. Kerr.

(*e*) Working Curve of an hour, Trans. Hygiene and Demography, p. 94, last paragraph and Resolution. Dr. Leo Burgenstein.

espiratory Tract. oat and nose. nsils, their use, &c. ocal organs. indpipe and bronchial tubes. urpose and method of breathing. ode of growth of lungs.	The importance of breathing through the nose. Protection against variety of temperature. Distinct singing and speaking. Care of the bronchial tubes. Value of exercise to expand lung cavity. Condition of breathed air.
e Alimentary Tract and Organs concerned in Digestion. Position, purpose, secretions. Mouth. Dentition, Salivation. Gullet or food pipe. Stomach. Intestinal canal. Liver. Lymphatic system.—Its functions.	Mastication. The various foods needed to supply the elements required for building up the body. (*f*) Need of varied diet for stimulating appetite. The value of regular hours for meals. Value of various combinations of food elements, and the principles of good cooking. Digestion, effects of irritants in stomach. Need of regularity in functions.
Integumentary Organs. — Structure and functions. Skin.—Its secretions. Nails.—Hair.	The value of cleanliness.
Special Senses.—Structure and functions. Eye. Eyelid. Tear gland, tear duct. Involuntary muscular movements. Myopia, hypermetropia, astigmatism. Ear. Use of Eustachian tube. Nose. Taste, organs of. Touch, organs of. Muscular tension and movement.	Care of the eye. (*g*) Good print and style in lesson books. The position of the children in class-room. Correction of errors in sight. Causes of fatigue. Change of occupation for eyes. How impaired by cold. Care of the ear. Noxious odours. Detection of noxious effluvia. Association with smell.

FOODS.

The student should show a real though elementary knowledge of the constituents of foods.

Food. The best methods of cooking various foods. The storage of food. The necessary supply of different foods to the human body at different stages of its development.	Their distinctive values in the system for purposes of growth and repair, &c. (*f*) The value of variety in food. The value to the body of fresh foods as contrasted with preserved foods. The law with regard to food and milk supply, unsound and unwholesome or adulterated food.

(*f*) Physical and Biological Facts. Pp. 20 to 23 and p. 40, Foundations of Success. De Brath.
(*g*) Ocular Hygiene in the School. Journal of American Public Health Association, April, 1[illegible], p. 140. Jackson.
(*g*) Eyesight, and how to lose it. Priestley Smith.
(*g*) Eyesight in School Life. Snell.
(*g*) School Hygiene. J. Kerr. Statistical Society, Journal of the, Vol. LX., pp. 613—660.

Clothing.

Clothing.

Students should show the power of applying knowledge of health laws with regard to clothing.

The requirements of good clothing.

Texture, colour, form of clothing in relation to evaporation of moisture, radiation of sun's heat, &c. The allowing free movement of the limbs and vital organs.

How these may be obtained without interfering with the action of the skin in its function of regulating the temperature of the body and aiding the purification of the blood.

The cleansing of clothing.

Physical Exercise.

The student should show a practical knowledge of the value of physical exercise.

Physiology of the muscular system.

Muscular development and its relation to the organs and functions of the body.

The general result. In giving aim to restlessness, in developing each part and function of the body, in correcting inherited tendencies, &c. *(h)*.

For this purpose they must appreciate the value of simplicity of apparatus, the aim being Hygiene, not skill.

Carpentering and Gardening as manual occupations, should be understood to provide a base of concrete perceptions for the development of the brain in abstract thought. *(k)*.

School Accidents.

The student should furnish evidence that he knows how to give first aid in the following:—Fits and fainting, sprains and bruises, cuts, burns and scalds, poisoned wounds, frozen limbs, swallowed pins and other sharp objects, bleeding of the nose, dislocations, bites and stings, poisoning and drowning.

Infectious and other Complaints.

The student should show a knowledge of the early symptoms of the following diseases: Scarlet Fever, Measles, Small-pox, Chicken-pox, Simple Fever, Diphtheria, Whooping Cough, Mumps, Ophthalmia.

The law as to the notification of infectious diseases, exposure of infected persons and things, disinfection and cleansing.

And that he has a sufficient knowledge of their mode of propagation to be able to take suitable precautions against the spread of those that are infectious, previous to receiving definite instructions from a doctor or sanitary officer.

The student should also understand the necessity of health certificates as a protection to public health, as well as to schools.

Adenoid growth at back of nose.

Breathing by the mouth.

(h) Physical Education. Trans. Hygiene and Demography, Vol. IV., pp. 110 to 118. Geo. White, B.A.

(k) Manual Training in relation to Health. Trans. Hygiene and Demography, Vol. IV., p. 123. Philip Mangus.

symptoms of brain over-sure.	Its remedies in rest of body; abundant food and sleep; change of occupation; limited length of lesson; absolute relaxation of mind and nerve force between each lesson; avoidance of external stimulants (*e g.*, marks, competitive examinations, awards); teaching by means of the concrete; employing several senses; manual training in construction as a base to abstract thought; and by obtaining health certificates of fitness of each student from the family medical man before allowing a student to enter upon a term's work. *(k)*, *(l)*, *(m)*, *(n)*, *(o)*, *(p)*, *(q)*.
Chorea and its causes.	
Diagnosis of dull and mentally defective children. *(k)*.	
Deodorants. Antiseptics. Disinfectants.	

(k) Study of Children and their School Training. F. Warner.
(k) Manual Training in relation to Health. Trans. Hygiene and Demography, Vol. IV., p. 122. Philip Magnus.
(l) Physical Indications of Injurious Schooling. Trans. Hygiene and Demography, Vol. IV., pp. 20 to 24. Octavius Sturges.
(m) Home Lessons after School Hours. Health Exhibition Literature, pp. 342 to 350. Sir J. Fayrer.
(n) Foundations of Success. Stages of Growth, pp. 136 to 159. de Brath.
(o) The Effect of Modern Systems of Compulsion. Education and Competitive Examinations on the Mental and Physical Health of the Community. Health Exhibition Literature, p. 315. Pridgin Teale.
(p) Overwork in School. Health Exhibition Literature, p. 323. Brudenell Carter.
(q) Outlines of Pedagogics, p. 68, and pp. 100 to 105 Reine, translated by Van Liew.

PART II.

HYGIENE OF SCHOOLS AND PRIVATE DWELLINGS.

General.

Individual and social hygiene as far as regards school life, including the necessary municipal and legal sanitation.
Site of private dwellings or schools.
Effect of neighbourhood, of sea, or large sheets of water.
Effect of vegetation.
Soil in town and country. Natural drainage of subsoil. Artificial drainage of subsoil.
Local elevation. Aspect with reference to sun and winds.

Structural.

Planning of Houses.

Dwelling and sleeping apartments, kitchen, offices, &c.

Planning of Schools.

Arrangement of assembly-room and gallery, class-rooms, studio, music-rooms, gymnasium, and of cloak-rooms, lavatories, water-closets.
Structure of walls and floors for class-rooms, lavatories, &c.
Playgrounds.
Requirements of Educational Department.

Water Supply.

Wells. Causes of pollution and means for their prevention.
Constant and intermittent systems.
Cisterns. Material and construction. Position and cleansing. Separate cistern supplies for closets.
Filtration of water
Drinking supply in schools and public buildings.
Provision for cleansing drinking vessels.

Drainage and Disposal of House Refuse.

Lavatories, &c.

Simplest effective fittings for basins and supply and waste pipes, and their discharge in open air.
Open channels, traps, &c.
Arrangements of school lavatories.

Water-closets.

Good and bad types.
Position in building.
Walls, floors ventilation, waste preventors, pans and traps, connection with soil pipe, ventilation of traps.
Soil pipes, position, size, material, ventilation.
Drains, position outside building, size, material, inclination, ventilation. Methods of testing.
Manholes, ashpits, and dustbins.
The law as to the collection and disposal of dust and refuse.

WARMING.

Of halls and corridors, lavatories, class-rooms, &c.; by stoves, hot water, hot air, open fireplaces. Effect of radient heat on atmosphere and health. Position of open fireplaces in class-rooms. Time occupied in warming a room, including the walls and furniture. Fire screens and guards.

LIGHTING.

Natural. Position and size of windows, with regard to ceiling and floor. How light should fall on occupants of a room.
Artificial. Purposes to be considered, method, arrangement of lights, shading, pavement lights for passages, &c.

VENTILATING.

Quality of air.
Amount required.
Renovation of air
Organic Impurities.
Ventilation of buildings, of class rooms occupied, of corners where air stagnates.
Mechanical ventilation, plenum and suction.
Consideration of the daily use of the different parts of the building.

FURNISHING. *(r).*

Seats and desks, slopes, adjustments.
Teacher's platform.
Books and Printing.
Colour of walls.

(r) School Hygiene. Statistical Society, Journal of the, Sept., 1897, pp. 656—659. Kerr.

PART III.

HYGIENE IN EDUCATION.

From infancy to young manhood or womanhood, including the application of the necessary physiology and psychology.

Hygiene properly belongs to the training of home; but, under the present system of education, so much of a child's lifetime is absorbed by school, that it is necessary that hygienic training should also be carried on in the school. The needs of teaching hygiene in schools and home will be required only until the hygienic environment of child life is firmly established. In homes of the well educated the principles of health will then be applied.

The student should show that he has a knowledge, obtained from observation, of the truth that education is a continuous process beginning from earliest infancy, including the environment of the body as well as of the mind, and that that being the case, hygiene in education is bound up in every step of bodily, mental, and moral development. (*s.*)

The student should show a special knowledge of The health laws relating to bodily condition of childhood. Laws of health relating to mental condition of childhood.	Observation and understanding of mind development during the period of growth from 6 months to 8 years, by means of imitation, powers of observation aiding constructive power. How these powers should be trained by means of the surroundings of child and not by special appliances. (*t*), (*u*).
Psychological working of child's mind in acquiring knowledge.	Recognition of the hygienic need of mental training as a part of bodily hygiene.
The using of various senses to vary the work of the brain.	Should deal with tangible facts as basis for abstract thoughts. That intelligence is rendered healthy by memory being exercised only on matter already grasped by the the mind. (*v*), (*w*).
Ethics of character-building. Mental presentation of moral forces as an aid to character-formation.	Recognition of the hygienic fact that *moral* training can only be given through the intelligence, and that abstract truth must be taught on the concrete facts. (*x*), (*y*), (*z*).

(*s*) Education of Man. Froebel.

(*t*) Health of Children. Angel Money.

(*u*) The Claims of Childhood. By Mary D. Sturge, M.D.Lond. Journal of Sanitary Institute, Vol. XX., Part I., 1899.

(*v*) Healthy Education of Brain and Body. Humanitarian, Feb., 1899. I. White Wallis.

(*w*) Mental Education. Foundation of Success, Chap. 3, p. 61. S. de Brath.

(*x*) A B C of Sense Perception. Herbart.

(*x*) Thirty Years of Teaching. Mental Education, p. 168. Prof. Miall.

(*y*) Outlines of Pedagogics. Theory of Guidance, pp. 80 to 85, pp. 163 to 173. Reine, translated by Van Liew.

(*z*) Special Report on Educational Subjects. Sadler. Vol. 1896–7. Ethics of Character-building, p. 204. Psychological working of a child's mind in acquiring knowledge, p. 561.

food and clothing from
; infancy to 6 months, from
; to 2 years. Principle of
and clothing to 8 years.

se of a child's skin and
organs in throwing off
atter from the body in
ion, refuse, &c.

Hygienic instruction must be understood as consisting in establishing intelligent interest in children, as to the reason of all cleanly habits with regard to the skin (this can best be done when in the act of washing them): as to the danger of draughts; the habit of getting out of draughts and putting on a wrap when the body is cooling after exercise in games, &c., should be established in child nature. The habit of ignoring surface sense irritation. Such habits soon become a sub-conscious development, and are absolutely necessary to health. These intentional habits should include the expelling of all refuse solid and liquid matter from their bodies at a regular time during the twenty-four hours. Children can take an inquiring interest in all hygienic appliances of home and school, which will lead to them taking care of such things as drinking water cisterns, filters, stoves, traps, gulleys, waste preventors, water-closets, drain-pipes, and manholes. Tho general activities of a child's mind may be made use of to secure the proper employment of such fittings by the child himself, and his natural assertiveness will pass the knowledge on, and see it put into practice in homes and schools by younger children.

The efforts of home and school should be directed towards maintaining perfect health in the individual. An attitude expectant of perfection in health and a slight scorn for preventable declensions would do much to foster habits conducive to good health.

THE CODE FOR 1899.

; should be able to offer intelligent criticism and amplifications
;ienic point of view on :—

lding Rules, 2, Section (*a*).—Page 79, Schoolrooms.

uirements, V.—Amplify page 79.

ks, 14.—Discuss page 82.

ming.—What is meant by direct radiation? Par. 12, p. 81.

dows.—Discuss lighting from the back, p. 80.

kery.—How this raised platform can be kept hygienically free from foulness beneath.

What difference it will make to the cubic space allowed to each child.

FELLOWS, MEMBERS, & ASSOCIATES ELECTED.

FROM JULY TO SEPTEMBER, 1899.

(*A complete list can be had on application.*)

Reg. No. — Date of Election.

FELLOWS.

813 1899. July. PARRY, William Kaye, M.A., F.R.I.B.A., F.R.I.A. IRELAND., ASSOC.M.INST.C.E., M.INST.C.E.I., *Palatine Chambers*, 63, *Dawson Street, Dublin.*

570 1899. July. THRESH, J. Clough, D.SC., M.D., D.P.H., F.I.C., *Sperryula, Chelmsford.*

MEMBERS.

* Passed Examination for Practical Sanitary Science.

‡ Passed Examination for Inspector of Nuisances.

1310 1899. July. ALLAN, James F., M.D., *Pietermaritzburg, Natal, South Africa.*

1311 1899. July. ANDREW, Thomas Hawkes, F.S.I., *Williton, Somerset.*

1312 1899. July. *BARKER, Charles, *Haulfan, Queen's Mead Road, Bromley, Kent.*

1313 1899. July. BRADLEY, Arthur Walter, ASSOC.M.INST.C.E., *Boro' and Water Engineer's Office, Bury.*

1314 1899. July. ‡BRADLEY, William Lawrence, *Rylstone, Tonbridge, Kent.*

1315 1899. July. *BROWNING, Egbert George, 81, *Vallance Road, Bethnal Green, E.*

1316 1899. July. COPE, A. E., M.D., M.B., D.P.H., 26, *Bessborough Gardens, S.W.*

1317 1899. July. DAVIES, Major Arthur Mercer, M.R.C.S., L.S.A., D.P.H., R.A.M.C., *Simla, India.*

1318 1899. July. DAVIES, David Samuel, M.D., L.R.C.P., M.R.C.S., D.P.H., M.O.H., *Public Health Offices, Bristol.*

1319 1899. July. DAVIS, Joseph, M.INST.C.E., *Chief Engineer for Sewerage, Department of Public Works, Sydney, New South Wales.*

1320 1899. July. *DUNK, John de Lanoy, 92, *Cheriton Road, Folkestone.*

1321 1899. July. HEAP, Herbert, ASSOC.M.INST.C.E., *Ainslie Street, Grimsby.*

1322 1899. July. McCLEARY, George Frederick, B.A., M.B.CANTAB., D.P.H.CANTAB., L.S.A.LOND., *Church St., Ellesmere.*

1323 1899. July. McDERMOTT, N. Bernard, F.S.I., *Turret Lodge*, 100, *Cavendish Road, Clapham Park, S.W.*

1324 1899. July. McKENZIE, James. 15, *Church Road, Linsdale, Bucks.*

Reg. No.	Date of Election.	
1336	1899. July.	Palmer, Philip Henry, M.INST.C.E., *Town Hall, Hastings.*
1335	1899. July.	Tucker, Benjamin Roper, 41, *Sisters Avenue, Clapham Common, S.W.*

ASSOCIATES.

‡ Passed Examination for Inspector of Nuisances.

1972	1899. July.	‡Allpress, Sidney, *Broughton, Huntingdon.*
1973	1899. July.	‡Awcock, Benjamin, *Horsted, Keynes.*
1977	1899. July.	‡Bates, Edward Percy, 26, *Upper Paddock Road, Bushey.*
1978	1899. July.	‡Bioletti, Frank Roberts, 16, *Moseley Road, Birmingham.*
1979	1899. July.	‡Boddy, John Read, 32, *Orchard Street, Norwich.*
1980	1899. July.	‡Bullock, Burnett, 1, *Romeo Villas, London Road, Mitcham.*
1981	1899. July.	‡Burbidge, Alfred, 11, *Murchison Rd., Leytonstone, E.*
1982	1899. July.	‡Butler, John, *Aldershot, Hants.*
1983	1899. July.	‡Carter, George, *Albert Road, Romford, Essex.*
1984	1899. July.	‡Clifford, Fredk. William, 104, *Richmond Road, Westbourne Park, W.*
1974	1899. July.	‡Davis, George Walter, 61–62, *Chancery Lane, W.C.*
1985	1899. July.	‡Fitch, Arthur Joseph Jeffreys, 11, *Uamvar Street, S. Bromley.*
1986	1899. July.	‡Gain, Alfred (*Quartermaster-Sergt. 1st Batt. Welsh Regiment*), *Aldershot, Hants.*
1975	1899. July.	‡Greenwood, Mrs. Florence J., *The Pioneer Club, 5, Grafton Street, W.*
1987	1899. July.	‡Johnson, Fredk. T., 18, *Queen's Court, Ulverston.*
1976	1899. July.	‡Keay, Harry H., 37, *Allison Road, Harringay, N.*
1988	1899. July.	‡Kinch, Thomas Edwin, 3, *Gainsborough Road, Felixstowe, Suffolk.*
1989	1899. July.	‡Martyn, William Hiscutt, 27, *St. James Street, Brighton.*
1990	1899. July.	‡Martyn, Walter North, 55, *Caversham Road, Reading.*
1991	1899. July.	‡Mitchell, Ernest George, "*Trewyn*," *Dulwich.*
1992	1899. July.	‡Moody, Christopher Theophilus, *Folkestone, Kent.*
1993	1899. July.	‡Munro, Daniel, 154, *Albert Street, Glasgow.*
1994	1899. July.	‡Richardson, Fredk., Jr., 26, *Werndee Road, S. Norwood.*
1995	1899. July.	‡Ridler, Walter, *Tewkesbury, Glos.*
1996	1899. July.	‡Scowby, Henry Marmaduke, 5, *Wilkinson Street, Albert Square, Clapham Road.*
1997	1899. July.	‡Stephens, Miss Catherine Florence, 2, *St. Leonard's Terrace, Chelsea.*
1998	1899. July.	‡Watmore, James, *Hill View, Alexandra Road, Aldershot.*

CONTRIBUTIONS AND ADDITIONS TO LIBRARY

JULY TO SEPTEMBER, 1899.

*** *For publications of Societies and Institutions, &c., see under "Academies."*

ACADEMIES (AMERICAN).

Philadelphia. Proceedings of the Engineers' Club, Vol. XVI., No. 2, March, 1899. 127 pp., 8vo. Philadelphia, 1899. *The Club.*

ACADEMIES (BRITISH).

London. *Institution of Civil Engineers.* Minutes of Proceedings, with other selected and abstracted papers, Vol. CXXXVII. 551 pp., 8vo. London, 1899. *The Institution.*

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NOTES ON LEGISLATION AND LAW CASES.

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POLLUTION OF RIVER.—*"Putrid solid matter"—Lawful exercise of right to impound or divert water—Rivers Pollution Prevention Act, 1876 (39 & 40 Vict. c. 75), ss. 2, 17, 20.*

The owner of weaving sheds impounded the water of a stream for manufacturing purposes, and after about three days discharged the sediment into the stream.

(The case is set out more fully in Part I. of the Journal of the Sanitary Institute, page 199.)

Held, by A. L. Smith, L.J., and Rigby, L.J. (affirming the decision of Lord Russell of Killowen, C.J., and Wills, J. [1899], 1 Q. B. 27), that the solid matter when it entered the stream from the reservoir was "in suspension in water" within the meaning of s. 20, and therefore not "solid matter" within s. 2 of the Act.

Held, also, by A. L. Smith, L.J., Rigby, L.J., and Vaughan Williams, L.J., that, assuming that what was put into the stream was "solid matter" within the meaning of s. 2, the defendant was protected by s. 17, and therefore not liable to be proceeded against under the Act.—(River Ribble Joint Committee *v.* Halliweel. The same *v.* Shorrock.) C. A. [1899]; 2 Q. B. p. 385.

INFECTIOUS DISEASE.—*Order for removal to hospital—Finality of order—Jurisdiction—Public Health Act, 1875 (38 & 39 Vict. c. 55), s. 124.*

The validity of an order for the removal to a hospital of a person suffering from a dangerous infectious disorder, made *ex parte* by a single justice under s. 124 of the Public Health Act, 1875, cannot be inquired into upon the hearing of a summons under that section before a court of summary jurisdiction for obstructing the execution of the order.—(The Queen *v.* Davey.)
Div. Ct. [1899]; 2 Q. B. p. 301.

Order for removal of patient—"Proper lodging or accommodation"—Public Health Act, 1875 (38 & 39 Vict. c. 55), s. 124.

Section 124 of the Public Health Act, 1875, enables justices to order the removal to a hospital of any person suffering from a dangerous infectious disorder who is without "proper lodging or accommodation." Where it was proved that a person suffering from such a disorder had proper lodging and accommodation, so far as he himself was concerned, at his father's house, but that he could not be

properly isolated, and there would be danger of infection to the other inmates of the house if he remained there:—

Held, that there was evidence that he was "without proper lodging or accommodation" within the meaning of s. 124.—(Warwick v. Graham.) Div. Ct. [1899]; 2 Q. B. p. 191.

UNWHOLESOME MEAT.—*Damage by reason of seizure—Costs of summons—"Full compensation"—Arbitration—Findings of arbitrator—Public Health Act, 1875 (38 & 39 Vict. c. 55), ss. 116, 117, 308.*

Meat belonging to the plaintiff, and alleged to be unwholesome, was seized by the inspector of nuisances of the defendant corporation, and condemned by a magistrate. The owner was proceeded against, but the summons was dismissed by the justice for a defect in form, and no order was made as to costs. On an arbitration under the Public Health Act, 1875, the arbitrator found that the meat was sound, and awarded the plaintiff compensation. In an action on the award:—

Held, that the finding of the arbitrator as to the soundness of the meat was conclusive; that the corporation were liable to pay to the plaintiff full compensation for the damage sustained by reason of the acts of the officer of the corporation; and that such full compensation included the costs to which the plaintiff was put in opposing the summons.—(Walshaw v. Brighouse Corporation.)
C. A. [1899]; 2 Q. B. p. 286.

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CONGRESS AT SOUTHAMPTON.

SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

PAPERS AND DISCUSSIONS.

The proceedings of the Section commenced with an Address by the President, Sir JOSEPH EWART, M.D., F.R.C.P., J.P. (See page 348).

"*Recrudescence of Plague in the East,*" *by* Professor W. J. SIMPSON, M.D., F.R.C.P., D.P.H.

(FELLOW.)

ABSTRACT.

THE sudden disappearance of plague from Europe is not to be accounted for by the commonly-received view that it was due to advancing civilisation. The absence of plague—even for a long period—is no absolute proof of the immunity of the locality. The city of Bombay was free of plague for nearly two centuries, and yet it would be impossible to state that the city, taken as a whole, is less protected now by sanitation than it was during the two centuries, or that the people and its government are in a less civilised state. Since its appearance in China the plague —notwithstanding the slow character of its extension—has travelled a great distance. In the first two years it travelled 3,000 miles westward to Bombay, and in the next three years it continued its course at about the same rate. Since its advent plague has caused in India over a quarter of a million deaths, the worst feature being its annual recurrence. Poona was but recently in the throes of its third epidemic, over 150 of her inhabitants dying per day, which, in a town of such small dimensions, is an enormous mortality, as may be gathered from the statement that if a similar mortality prevailed in London the metropolis would lose over 10,000 persons a day. The mortality in Poona is all the more serious, as from a personal

inspection of the town and of the interior of the houses I can state, that if inefficient drainage be excepted—which allows of water-logging of the soil—it is no worse as regards sanitation and overcrowding than hundreds of towns of a similar size in Europe, and is certainly in a much better condition than many.

The re-appearance of plague in Egypt after an absence of 50 years, with its extension into Portugal, is a matter of profound interest, because it indicates that this plague from China partakes rather of the nature of a pandemic than an epidemic, and possesses that which other plague epidemics for nearly the last 200 years have lacked, viz., the quality of diffusiveness, which defies the precautions, even as revised by the Venice Conference, and hitherto adopted against its progress. The commercial conditions in the West are more favourable to its diffusion than those of the East. No danger practically existed of plague spreading from India to Europe by sea, as the commercial intercourse between India and Europe is maintained by Europeans who belong to a superior class, and who have hitherto enjoyed an exceptional immunity from plague. The danger to Egypt of infection by plague has been not so much in its commercial relations with India but in its religious pilgrimages, which bring Egyptian pilgrims in the Hedjaz into very close relationship with Mahommedans from infected centres. The commercial relations between Egypt and Europe are, on the other hand, of the most intimate nature, kept up by fishermen, traders, and travellers, and extending to all classes, and including those likely to be affected with the disease. Close proximity also plays an important part. It was in consequence of these facts that the cholera in England in 1866, and the cholera in Spain in 1884, followed its prevalence in Egypt. With a new centre in Portugal the risks are considerably enhanced. For England is not more than two or three days' sail from Portugal.

With a thorough knowledge of the situation, it is desirable to consider the precautions to be taken. All preventive measures must be based on our knowledge of the disease. This has been much added to since the plague broke out in China. Two discoveries of the first magnitude have been made, the one by Kitasato showing that the bacillus is the cause of the disease, the other by Haffkine proving that from this bacillus a prophylactic may be prepared which has strong protective powers. These, combined with the fact that plague is a disease which only slowly gains a firm footing in a locality renders the checking or mitigation of an outbreak much more hopeful and certain than before.

The danger of extension, as in some other infectious diseases,

lies in our ignorance as to medium and agents by which the bacillus gains access to the body, causing a dependence on general rather than special measures of defence. This is a defect, which may be far reaching in its result. It is a disadvantage which every opportunity should be taken to remove, and for this purpose it seems to me to be of paramount importance that the governments of those civilised countries, which are affected with plague, should not be content in merely endeavouring to combat the disease by every known method at their disposal, such as isolation of the sick, evacuation and disinfection of infected houses, &c.; but they should systematically, as a part of the sanitary defence of the country, establish laboratories and special departments for organised research and enquiry into the mode of spread of the disease; for it is only by the adoption of these methods that success is likely to be attained.

To the precautions advised by the Venice Conference to prevent importation, I think two others should be added, viz., use should be made of the protective power of Haffkine's prophylactic, and rats should be dealt with at infected ports, on the voyage on ships from infected ports, and on arrival in healthy ports. The practical application of Haffkine's prophylactic to the crews of all ships and boats, large and small, coming from infected ports would tend to reduce the risks of importation. Inoculation also might be offered to those who wished to cross the frontier.

In connection with the checking or stamping out of plague, when it breaks out on land, the early notification of disease is of immense advantage, for it allows measures to be early and promptly applied, so that the sick can be isolated, the inmates of the house removed and watched, and the house disinfected. For large cities the camping out system, available for villages and small places, where it has proved so useful, is impracticable, especially if a large area is affected; but in both villages and towns, whenever a case of plague occurs, not only should the inmates removed from the infected house be inoculated, but also the inhabitants of the houses within a certain area.

It is possible with proper organization to deal with plague as with an outbreak of small-pox. Large supplies of Haffkine's prophylactic are necessary in order that every possible contingency may be provided against, and the preparation of these supplies, which require time and a skilled organization, ought not to be left to the last moment to meet plague. The organization for defence requires to be placed on as complete and in as efficient a state of preparedness in every respect as the army and navy of the country would be if there was danger of invasion. The sanitary organization of the country inspires confi-

dence that all will be done, which our present knowledge suggests, to protect the country against disease. But, as stated previously, that knowledge is very imperfect.

In the case of an outbreak of disease, such as typhoid fever, in this country, a scientific investigation is undertaken as to its cause and mode of spread. It is known that typhoid fever is caused frequently by contaminated water. This, however, does not prevent further investigation being made in order to ascertain if any new facts can be discovered with reference to the epidemiology of the disease. Epidemic after epidemic is carefully enquired into. A similar enquiry is certainly called for in regard to the plague, which is a disease that this generation is happily not familiar with. The importance to this country of observing its behaviour as modified by conditions in Europe, is such that the study of it in its epidemiological, prophylactic and curative aspects should be undertaken by Government. To this end it would appear to me advisable that a small commission of experts of physicians, epidemiologists and bacteriologists should be sent to the Peninsula for that purpose. It is a matter of imperial concern and admits of no delay.

Hitherto I have said nothing as regards general Sanitation. That attention to this is necessary goes without saying, while preparing to immunise individuals with Haffkine's prophylactic, every endeavour should be made to immunise the locality by sanitary measures. But in this connection it should be borne in mind that excellent water-supplies are of little protection against plague and it has been perhaps to the acquisition of pure water-supplies that the attention of Sanitarians has of late been chiefly directed, while measures for the dryness and purity of soil have taken but a comparatively secondary position; and it is therefore to this branch of sanitation that I would commend that special attention be paid. Localities in which overcrowding, poverty and filth exist have always been the favourite haunts of plague, and it is on these localities in every country and in every large town that protective efforts should be concentrated by the authorities concerned in order that if the first line of defence is broken through, the plague may not find conditions favourable to its growth and rapid spread. Poverty we have always with us, overcrowding may be lessened or at least regulated or watched, and filth may be easily removed and the dirty spots cleansed.

Dr. J. Howard-Jones (Newport) said he was one of those concerned in the protection of the ports of this country against the plague. They had frequent communication between Newport and Portugal, and the subject was most important. Reference had been

made to the Venice Conference; unfortunately, although the Conference had been completed for more than two years, they were unable to obtain the records of the Conference, or the records of its conclusions. They were in the hands of the Government, but even the Local Government Board were only supplied with private copies. Then, with regard to the serum, in order to be able to deal with a case of plague if it arose, he had applied to the Jenner Institute for some serum, but unsuccessfully. However, he succeeded in obtaining a dozen phials from the Pasteur Institute. He would also like to get some information, if possible, on the subject of rats. In all sea-port towns they were troubled with rats, and the question was how to get rid of them? Rats did get ashore, either by means of rat-catchers or otherwise, and there was a danger of spreading infection among rats on shore. There was also the question of the immunity of Europeans in India, which appeared to cease when the plague arrived in Europe. The Portuguese were readily attacked, but in India, Europeans, with few exceptions, were immune to the disease.

Dr. G. MILLSON (Newington) said he considered the suggestion of Professor Simpson, that a Royal Commission should proceed to Portugal to study particular phases of this terrible disease a most valuable one, and he thought the Section should take some steps to recommend the Congress to appeal to the Government, that such a Royal Commission should be sent. One was particularly struck with the great likeness between the plague and diphtheria. Professor Simpson had said it was not communicable by water, but it was in a waterlogged subsoil, with bad drainage and overcrowding, just the very conditions they had for the propagation of diphtheria, and if they had no greater success against the plague than they had had against diphtheria it was a very serious thing for England.

Lieutenant-Colonel J. W. CLARKSON, I.M.S., said he entirely concurred with the recommendation that a Commission should be appointed, but he was not quite sure that it should go to Portugal for any length of time, as the scientific work would be much better done in this country. Prof. Simpson had remarked upon the curious way in which the plague came on in India, not at any particular time or season in Poona, while in Bombay it came on at the end of the rainy season. It was due to overcrowding and want of ventilation. Poona, just at that time, was overcrowded, it was the rainy season, and the place was crowded, and rooms were insufficiently ventilated. The same thing was the case in Bombay. It occurred there after the rains, when all the great business operations were taking place, when numbers of people flocked in to work at the docks and mills, and the population was greatly increased. His opinion was that apart from the protective influence of Professor Haffkine's prophylactic the best enemy against the plague was plenty of fresh air. Natives did not open their windows sufficiently, whilst Europeans regularly did so, and seldom closed them. As an instance of the beneficial effect of free ventilation, he

[illegible] that he had a good deal to do with the famine camps in [illegible] Presidency, and although cases of plague were brought [illegible] there had been no extension of the plague. The people all lived in [illegible] huts, which were not allowed to be closed both back and front, and there was always plenty of fresh air passing through them.

Dr. [illegible] (Liverpool) said that for him the paper had a very [illegible] interest as a medical officer of a large sea-port, having dealings with every other port in the world. He asked the author of the paper to give his views as to the likelihood of plague [illegible] being conveyed by ants and mice, as well as rats. In regard to the question of overcrowding, he asked whether they had in Calcutta any such system of preventing overcrowding as existed in most large English towns. For example, they limited the number of people who might occupy a room in such a way that each one should have either 300 cubic feet where there was a separate bedroom, and if not, [illegible] cubic feet. He would like to know whether in Poona or Calcutta regulations such as these were in force. The relative importance and frequency of the transport of plague by land and by sea were points of great practical interest. The disease was one which, if it once gained a footing in any part of this country, would do a vast amount of mischief to commerce at the port. He also asked whether he understood aright the suggestion that crews of vessels trading to and from infected ports should be rendered immune by Haffkine's prophylactic, and if Professor [illegible] the part of the crews to [illegible] whereby it could be [illegible] closely affect ports having [illegible] at the present time.

[illegible] said the ports were the first line of [illegible] should be thoroughly [illegible] provided by the Local [illegible] obtaining at very short [illegible] as they now undertake to [illegible] vaccinators. They had the [illegible] guard against the danger of any [illegible] into the country. In these days of [illegible] careful in coming to a definite [illegible] of any particular case. In [illegible] had a large passenger traffic, the [illegible] with a surgeon, and any case [illegible] was brought under immediate observation. [illegible] danger in ports which had mainly [illegible] carried no ship surgeon, and the [illegible] immediately made aware of the [illegible] disease, and what measures should be [illegible] and also what was his duty on arriving [illegible] instructions with that view, and had also

drawn attention to the danger of introducing the disease through vermin. During a survey some years ago, they visited the large firms associated with the port of Hull, and were informed that all rats caught on board their ships were killed and cremated. Then as to the notification of this special disease. Under the general Act, the Local Government Board could immediately place certain diseases amongst those already scheduled, and which it was compulsory to notify. The Local Authority whose district was exposed to danger could immediately adopt the same. When cholera occurred at Hull, not only was cholera a notifiable disease, but diarrhœa and choleraic diarrhœa were made notifiable also.

Professor SIMPSON (London) in reply said Sir Henry Littlejohn had asked a question as to how the plague had appeared in Hong Kong. Plague appeared in Hong Kong from Canton, and it had been imported into Canton from Yunnan, which is a centre of plague in China. There was an endemic centre in Yunnan, as there was an endemic centre in Mesopotamia, but the latter seemed to have been a dying volcano for the last fifty years. In Yunnan plague had shown a decided recrudescence for some ten years past, and, during that period, every now and again in China there was an invasion of the neighbouring localities, until in 1894 it arrived in Canton and caused 80,000 deaths out of a million. He was surprised to ascertain from another speaker that the sanitary department in England had not provided local authorities with the regulations of the Venice Conference, because in India they were provided with them within a month or so after its sitting, and he supposed the reason for their not being published in Europe had been that those who sat at the Venice Conference had imagined that the plague was not going to pass into Europe. The question had been asked: how long did the prophylactic serum keep good. He knew it to keep good for three or four months. His object in asking for a Commission to visit the Peninsula was in order that there should be an enquiry as to the mode of the spread of the disease, as modified possibly by European soil, as well as being a means to prepare the prophylactic, and assist in stamping out the disease in that locality. He looked upon the plague as an international matter. The Commission should prepare the prophylactic and send large quantities to England, so that we might be prepared for all contingencies. He quite agreed with Dr. Clarkson that plenty of fresh air was the best prophylactic, but what fresh air did they get in large crowded cities? Coming from India one was particularly struck with the want of open windows, and the extraordinary amount of bad ventilation. Some of the localities in London and elsewhere were just as overcrowded as those in India. Dr. Millson mentioned that in his district there were some localities with 400 persons per acre. In Calcutta they could not find a place with 400 persons per acre, but in Bombay there were places more crowded than that. As regards the manner in which rats should be destroyed, that was rather a difficult question. Professor Hankin endeavoured to inoculate the

lead to divided responsibility and imperfect supervision, unless the subordinate medical officers are of nearly the same quality as the chief medical officer. On the other hand, a small sanatorium is relatively expensive, and may be unnecessarily dull for the patients. Probably forty to fifty patients could be managed by one medical officer. Most of the newer sanatoria in Germany for the working classes have about 100 beds, and the Brehmer sanatorium for paying patients, now has a total of 335 beds, while the smallest complete sanatorium in Germany has, I believe, 16 beds; but there are few with less than 20 beds.

Component parts of a sanatorium.—In addition to the shelters in the grounds, a sanatorium consists of an Administrative, Commissariat, and Patients' departments.

The administrative department includes the offices, perhaps a board room, quarters for the medical officers, nurses and servants, a disinfector, mortuary, and frequently also engine and dynamo house, laundry, stables and farm. The servants should, if possible, have a block to themselves, or quarters over the kitchen block, male servants separated from female, and the housekeeper in some central part where she can control the indoor servants. Nurses must be within call of the patients but should have a private sitting room as well as bedrooms, the matron in touch with the other nurses. The chief medical officer's quarters should be within easy distance of the patients' rooms, and so placed that he can readily supervise them when in the grounds. Where there are several medical officers, one should have his room near the patients. The disinfector may be combined with the laundry and electric supply, the mortuary with the stables, and all these should be some distance from the patients' quarters, as well as, of course, the farm, if there is one.

The commissariat department, consisting of dining saloon, kitchen, scullery, store rooms, &c., should be far enough from the patients' quarters to prevent noise and smell from reaching the latter.

The patients' quarters are least like the rooms of an ordinary house. They include bedrooms, sitting-rooms, and accessory rooms, such as bath-rooms, lavatories, and the like. The chief points to be borne in mind in their construction are as follows: (1) They should admit as much fresh air and sunlight as possible, and be purged of foul air as completely as possible, approximating in this respect to the open air. (2) They should be free as far as possible from ledges and other dust-traps; all angles being rounded, floors free from cracks, walls washable, and ceilings cleansable. Both rooms and furniture should

be made with a view to ready cleansing with damp cloths. (3) They should be dry, and their windows should exclude rain and strong wind, while freely admitting light and air. (4) They should be cool in summer, warm in winter. (5) They should admit of patients being readily carried on couch or bed on to a balcony or terrace, or into the grounds. (6) There should be ready means of communicating with the doctor, nurse, and servants. (7) The rooms should be quiet and reasonably private.

Size and shape.—Cubic content is of far less importance than large inlets and outlets for ventilation kept constantly open. Too small a room, however, may be draughty, although this is less objectionable than a foul atmosphere. Oblong rooms with the narrow end to the front are less expensive than those with a larger frontage; but where expense is no object the latter are preferable. There should be one corner for the bed out of the direct air current, so that door and window may be kept open. There should only be one patient in each room. The only exception to this rule is in some cases where patients are without expectoration, cavities, or fever.

A southerly *aspect* is advisable wherever patients are likely to occupy their bedrooms in the daytime. But where they only do so at night, and there is adequate protection outside against wind, the aspect is of less consequence.

Ventilation.—A chimney or corresponding air-shaft should always be present, even where the heating is by pipes. A large ventilating opening should be placed over the door. This should not be covered with a grating. Small valve ventilators are not to be recommended as inlets. Their valves are noisy, the area is so small as to be apt to cause draughts, and their gratings collect the dust. Tobin's tubes are permissible; but all such contrivances are unnecessary so long as the windows are kept open and there is sufficient outlet. Boyle's extractors, or steam-jets and similar contrivances may, however, be useful in expelling foul air.

The *windows* should occupy at least half the wall space of one side. If casement windows are used, they should open outwards to right and left and have a transom over them or else an adjustable blind rising from below. The window sill should not be more than 2 ft. from the ground, so that a patient lying on a couch can easily see out. If there is a terrace or balcony outside a height of 6 in. or 1 ft. is preferable, unless the part below the window is removable. Very large ordinary English or guillotine windows have some advantages, although only half the area is available when the sashes are open to their full extent, and there is less protection against wind. They can

readily be fixed in any position; they allow of a double current of air, and give a greater sense of security at night. With such windows sliding shutters may be used with parallel horizontal sloping laths; with casement windows the shutters must be hinged from above or below. At Ruppertshain a kind is used which can be let down from within the room like a hood, and used either as a sun blind or rain screen. Such shutters are also useful in excluding light in the early morning, as some patients can only sleep in the dark. All window fixings and blinds should be free from noise when the wind blows. Ordinary roller blinds or venetian blinds are apt to be noisy at times with wide open windows.

If *verandahs* are provided, they should have glass roofs. To give sufficient protection from driving rain, they should be 10 ft. wide. They may, however, be replaced entirely by shelters to the sides of the house, if the couches can be wheeled out from the bedrooms into the shelters. *Balconies* are apt to darken the rooms below, if they are wide enough to be practically useful. They should therefore be placed over parts not frequented by patients, or converted into part of the ceiling of the room below. At Dannenfels an inequality of the ground is utilised to provide a large balcony or terrace level with the first-floor, over cellars level with the ground-floor. The *door* of the room should have a frame flush with the walls, and be free from panels or ledges which collect the dust. If the door opens into a well-ventilated corridor, it may be replaced in hot weather by a skeleton wire door, privacy being secured by a screen. Ordinary bolts or locks should not be supplied to the bedroom doors. If present, the matron should have a master key in case of accidents. There should be some means of fixing the door open at various angles, to prevent slamming. *Cupboards* should have rounded angles; they should not be sunk below the level of the floor, and should have no dead space above. Movable wardrobes can be better ventilated than cupboards. The *floor* of the room may be of waxed and polished boards, or of well-fitting unpolished boards covered with linoleum. The latter should be all in one piece, and a trifle larger than the floor itself, curling up at the sides, to be fastened by a wooden fillet, as at Dr. Burton Fanning's new sanatorium. In some German sanatoria a material called *torgament* is used for flooring. It consists of wood shavings incorporated in some way with cement, and is warmer to the feet than the latter, while equally indestructible and capable of disinfection.

The *walls* may be of Parian cement, as in many hospitals, or of ordinary plaster, painted or papered with washable paper,

or panelled with wood and varnished, or covered with lincrusta or similar materials. Wood-panelled walls are said to become infested with mice. An inexpensive method of transforming an ordinary lath and plaster wall is to paint it with silicate paint. The *ceilings* should be without cornice, with rounded angles. In some sanatoria they are of varnished wood panelling. They may, however, be whitewashed, or painted, or papered.

Arrangement of bedrooms.—The bedrooms should be arranged in a single row, rather than on two sides of a corridor. The corridor, which may be paved with terrazzo or tiles, or covered with linoleum or some less noisy material, should end externally and have numerous windows, which should be opposite the doors of the bedrooms if there is adequate shelter to the north. They are intended to be almost constantly open. It was suggested to me by Dr. William Ewart that an offensive patient might contaminate the air of the corridor, and that this objection could be overcome by closing the door of the bedroom and letting the ventilator over it communicate with the outside by a shaft above the corridor. Another way would be to replace the corridor by a covered walk or verandah. No rooms should be placed to the north of the corridor, excepting such as can be left almost constantly open.

Sitting rooms for patients should be neither large nor numerous, excepting such as are really modified summer houses. Recreation pavilions should also be out of doors. The dining saloon must of course be large and well lighted and ventilated. During a good part of the year in England the meals could quite well be taken in a summer house or tent. A warming cupboard would be required for plates and dishes and a warm box to carry the food.

Accessory rooms.—The lavatories, bath-rooms, W.C.'s, cloak-rooms, and box-rooms should not be too far from the patients' bedrooms, but may be placed on the north side in built-out pavilions. No unnecessary luggage should be left in the bed-rooms, and it is a good plan if possible for all ablutions to be done in the lavatory, so as to keep the bedroom drier. In private sanatoria, however, this cannot well be done. In the Nordrach Sanatorium a douche apparatus with hot and cold water is placed in each patient's bedroom. Waste pipes always become foul unless capable of being mechanically cleaned, so that no fixed basins with narrow waste pipes should be employed, least of all in the bedrooms. Sanitary arrangements may be constructed on ordinary principles. It is unusual to have tubercle bacilli in the excreta of such patients as would be admitted to a sanatorium. With water carriage there cannot possibly be any danger from the excreta; and with dry

methods exposure to light and air or admixture with chloride of lime is sufficient to disinfect them.

Consulting and waiting-rooms may quite well be in a separate pavilion or summer-house, as those who are not fit to walk so far would be seen in their bedrooms. Drug room, laboratory, room for Röntgen rays and photography, inhalation-room and the like, would be put next the consulting-room.

Heating.—The sanatorium may be heated by hot water or steam pipes, if care is taken not to allow charring of dust particles to take place, or over-heating of the rooms. Most of the German sanatoria are heated by low pressure steam pipes, as the quickest and most economical way of warming a large building. Open fires are invaluable for ventilation, but require more attention and are apt to be dusty. Closed stoves are only permissible with a cooling jacket, and in any case are of doubtful expediency. At Nordrach, where water power is abundant, some of the rooms are now heated by electricity.

Lighting should be by electricity, or failing this, by lamps and candles. Gas is apt to render the air impure, unless special ventilating shafts are put for each jet. Incandescent gas-lamps with by-passes are not to be recommended. Acetylene is used in some sanatoria, but appears to me to be unsuitable.

Arrangement of the sanatorium.—Such being the component parts of a sanatorium, it remains to consider how they may be best arranged. This consideration, however, depends largely upon the site and the area of suitable ground. On mountain sides it is usual to build a sanatorium in several storeys; where more level space is available the building may consist of a number of low cottages or villas.

Number of floors.—There is some prejudice in this country against putting bedrooms on the ground floor; but where the foundations are properly built, with damp-proof courses and the like, and the ground is dry and well drained, it is not clear that buildings of one floor are any less suitable than higher ones, so long as sufficient privacy can be ensured. Couches and beds may be more easily wheeled out from the ground floor; no lifts, staircases, or balconies are needed, and there is no risk of one floor ventilating into the next. But in higher buildings a better view is obtained from upper floors, and the bedrooms above are more easily kept private, and are quieter. And by suitable arrangement of the staircases, corridors, and approaches it is quite possible to prevent the entrance of foul air into upper rooms. All corridors and staircases should have free and direct communication with the outside air. This also applies to cellar stairs. As regards relative cost of high and low buildings, this depends largely upon the amount of level space in suitable spots available.

Cottage sanatoria.—Temporary sanatoria of tents, wooden buildings, or "*baracken*," are frequently interdicted by Local Authorities, and need not therefore be considered. In a large sanatorium the cottage system has both advantages and disadvantages. Different sets of patients can be readily isolated, as, for instance, if an infectious fever breaks out. A small building having a relatively larger wall surface than a larger one is more easily ventilated from all sides. This is an advantage in a sheltered situation, a disadvantage in an exposed one. Scattered small buildings need a relatively larger staff, and are more expensive to supervise. On the other hand, they are less "like an institution," and may therefore be preferred by some patients. In a cottage sanatorium some patients have necessarily to walk further to the common dining saloon, as the plan of having separate dining-rooms for each block is inconvenient and wasteful. The more concentrated the plan, consistent with free ventilation, the easier and the less expensive are the supervision and management of a sanatorium.

Ground Plan.—I am able to show members the ground plans of a number of sanatoria. The chief varieties may be classed as follows, and several are illustrated in the plates following page 532 :—

1. Linear—straight, convex or concave.
2. Linear with wings or pavilions at a right angle.
    - (*a*) Open quadrangle—three sides of a rectangle.
    - (*b*) Closed quadrangle—not permissible.
    - (*c*) Bayonet joint—two sides of a rectangle.
3. Linear with wings at an obtuse angle.
4. Parallel lines joined by others at right angles.
    - (*a*) Letter T. (*b*) Letter H.
5. Radiating.
    - (*a*) From a straight line.
    - (*b*) From a central point.
    - (*c*) From a convex corridor.

Any of these plans may be arranged with interruptions.

It is not possible to say that any one of these plans is best in every case, as the nature of the ground and the degree of natural protection have to be taken into account. The less the natural protection, the greater the need of protection by means of a high building or of wings. In such a case the plan adopted at Hohenhonnef is a very good one.

Liegehallen.—There is some difference of opinion concerning the deep verandahs provided at many sanatoria, where patients

rest in company on their wicker reclining chairs. Febrile patients, who most need to rest, are best kept in more or less seclusion; but, for the hour's rest about meal times, there is no reason why non-febrile patients should not use the common verandah or "liegehalle." But such a verandah in front of patients' bedrooms interferes with quiet and privacy; so that "liegehallen" are often placed on either side of the building, somewhat like wings.

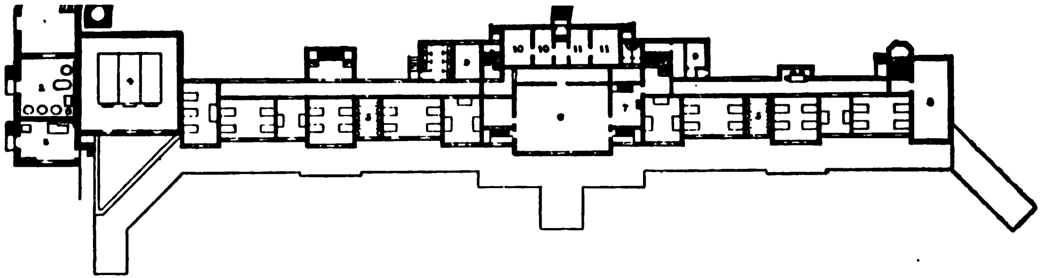
Covered corridors for walking exercise are also objected to by some; but, if they are very freely ventilated, they are useful in wet weather, as there is no special advantage in letting a phthisical patient get wet. Where there are pine woods, however, a much better walk can often be provided under this natural shelter. There is an increasing tendency to keep patients away from the building during the day, and if the grounds are of the right kind this is by far the best way.

In the treatment of consumptive patients we should try to reverse the usual conditions of town life, and instead of spending 20 hours out of 24 in an ill-ventilated set of rooms, we should make our patients spend the night in the airiest of rooms and the rest of the time out of doors, and should plan the details of the sanatorium in accordance with such a purpose.

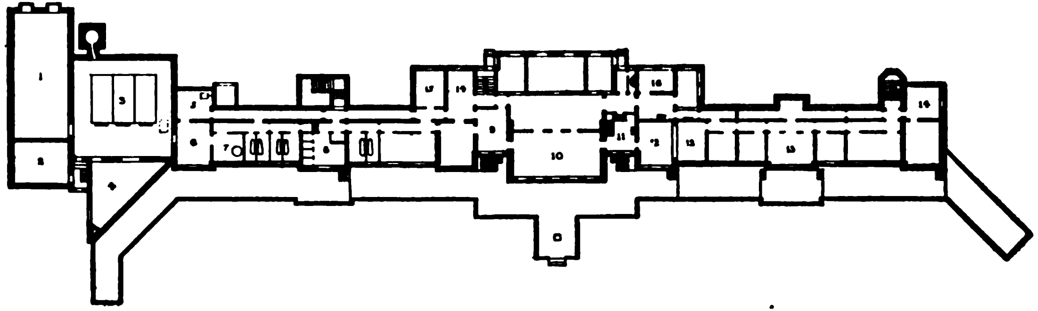
[*For discussion on this paper, see page* 538.]

"*The Recognition and Isolation of Pulmonary Tuberculosis,*" *by* G. A. HERON, M.D., D.P.H., F.R.C.P., Physician to the City of London Hospital for Diseases of the Chest.

CONCERNING the recognition of pulmonary tuberculosis: It would be waste of time were we, in this discussion, to dwell at much length upon the diagnosis of clearly defined cases of pulmonary tuberculosis. No question should ever arise concerning the diagnosis of such cases, for tubercle bacilli can almost always easily be found in the expectoration of the sufferers; and, failing this, the injection of some of the sputa into guinea-pigs, or the cultivation on suitable media of some of the expectoration of the patient concerned, will with certainty settle the diagnosis of the case. But, as we all well know, it is

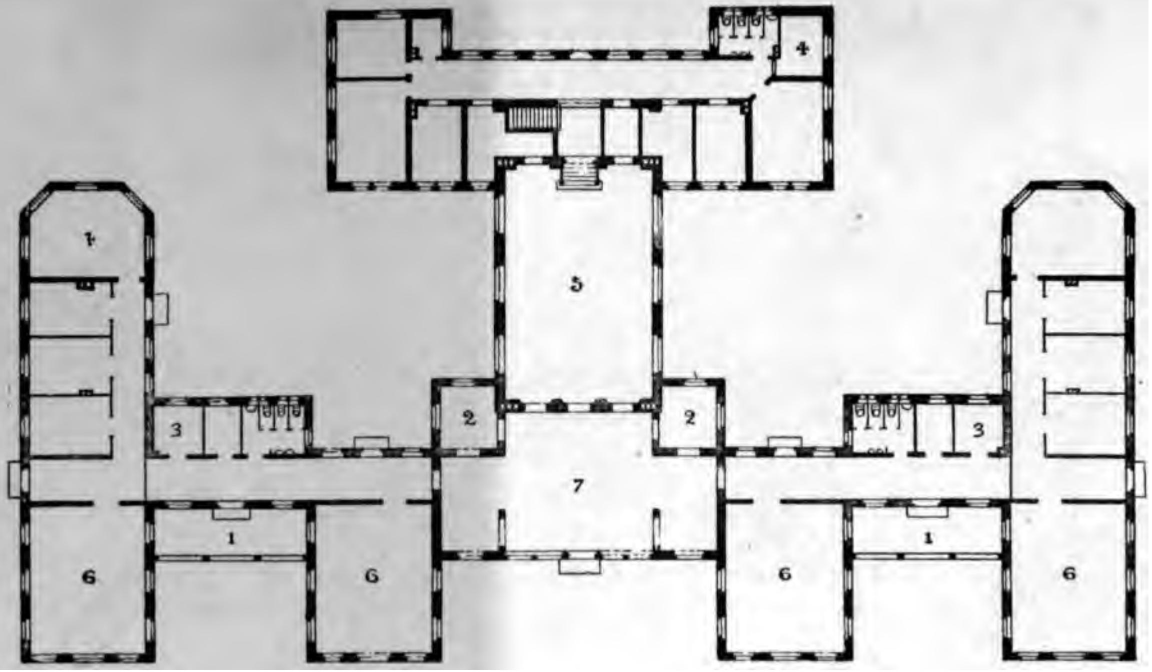


GROUND FLOOR



BASEMENT

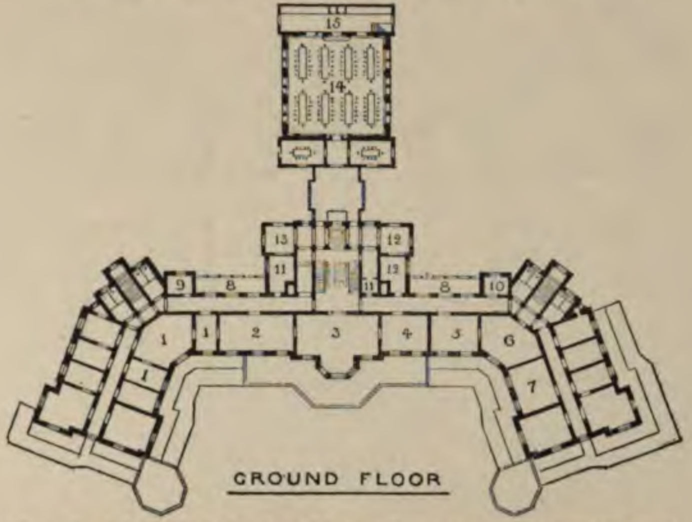
ODERBERG SANATORIUM.



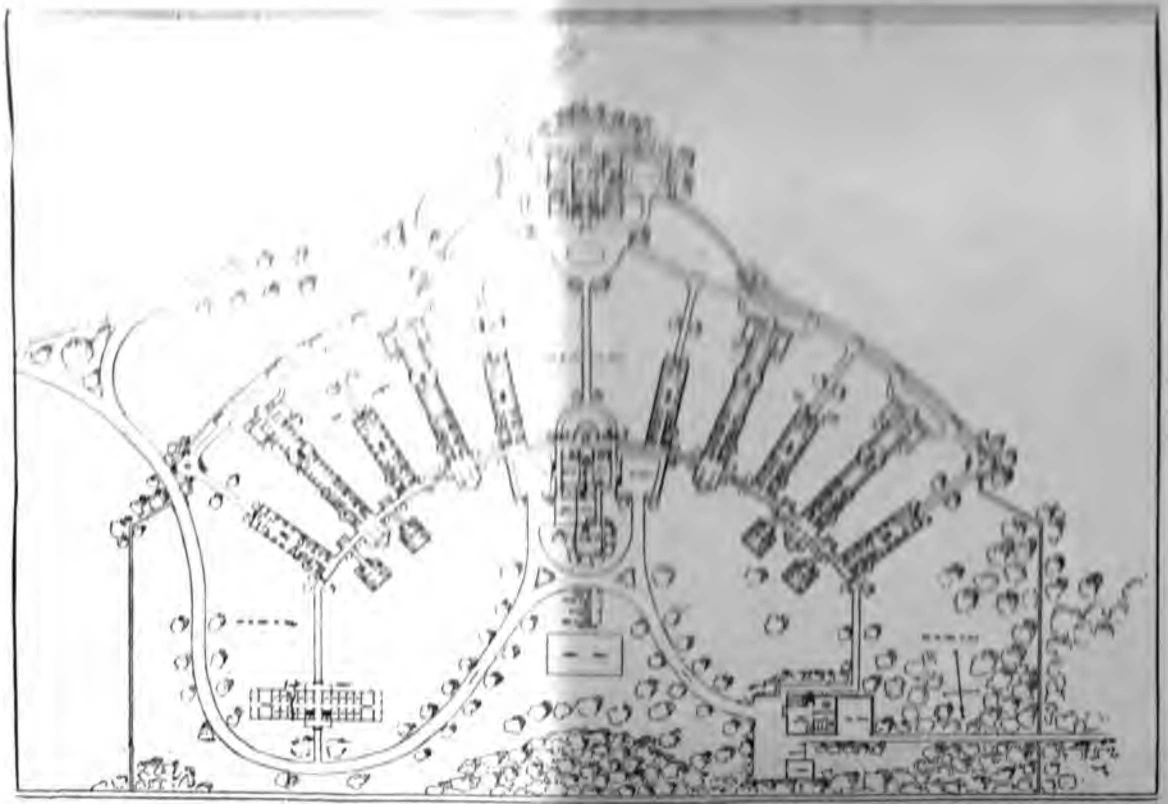
GROUND FLOOR

AT TSBERG SANATORIUM.

RUPPERTSHAIN SANATORIUM.



THE HOHENHONNEF SANATORIUM.



GROUND PLAN.

of the utmost importance in the interests of the public, as well as of the patient, that a diagnosis of the presence of tuberculosis of the lung should be made as early as possible in every case of that disease. I take it we are expected to give in this discussion our knowledge and our time to the difficult and important question of how to recognise, in its earliest stages, the first appearance of pulmonary tuberculosis.

My own experience leads me to the belief, that the earliest symptoms of pulmonary tuberculosis are seldom first to be detected in the lungs. The patient as a rule complains of some sense of lassitude following upon even the slightest exertion. He often says, "I am always tired." Should this phrase attract intelligent attention, it will, I think as a rule, be found that in those cases in which lassitude marks the beginning of tuberculosis of the lung there is evidence of some loss of weight, and the temperature rises to about 99 degrees between two and six o'clock p.m. Now, where these three facts alone are the symptoms of the case, and when on examination nothing in the shape of physical signs is found to explain these symptoms, there should remain in the mind of the patient's medical adviser a suspicion that tuberculosis somewhere, most likely in a lung, is the cause of the lassitude, of the loss of weight, and of the rise of temperature. By-and-bye cough appears; but oftentimes so slight is it that in the estimation of the patient it is not worth mentioning, and the fact that there is cough has to be elicited by means of leading questions. When, however, we find cough of this seemingly trivial kind associated with the three symptoms already mentioned, lassitude, loss of weight and rise of temperature of an afternoon, there is ground for the gravest suspicion that the patient has tuberculosis, probably in a lung.

In, I think, the great majority of these cases where there is cough, no matter how trivial the patient may believe the cough to be, there will be found some degree of dulness on percussion at some part of the chest. As a rule (and to which, in my experience, there are but few exceptions) the dulness shows itself first close to the apex of one of the lungs. I have, however, found dulness as the first detected physical sign of tuberculosis, exclusively at the base of the lung in a few instances; and on one occasion I found it at the level of the fourth rib, in the line of the middle of the right axilla. In the few instances referred to in which the dulness was detected at the base of a lung, and not elsewhere, there was no reason to suspect the presence of a pleurisy, recent or remote.

Now, where there is dulness on percussion in the type of case we have under consideration, there is, I think always,

some modification of the normal respiratory murmur. And this usually takes the form of more or less distinctly audible and prolonged expiratory murmur. To this physical sign I attach, in these early cases, very great importance as evidence of the presence of some amount of consolidation of the lung, at the part where expiration is audible and prolonged. Over the site marked out by these physical signs, and for some distance beyond it, there are, as a rule, to be detected increase of vocal resonance and of vocal fremitus. The persistence during a week of dulness on percussion, prolonged and audible expiration, and a rise of temperature, between, say, noon and six p.m. from normal to near or up to 99 degrees, would, I think, make it practically certain the person who showed these symptoms had tuberculosis of the lung.

But cases now and then come under our observation in which a speedy diagnosis is wanted, and in which we may find ourselves not justified in giving a diagnosis upon our own reading of the physical signs and symptoms, even after seeing the patient on more than one occasion. In these cases—my experience is they are not common—I should use as an aid to diagnosis, Koch's old tuberculin. In the very few cases in which I have used the old tuberculin exclusively for purposes of diagnosis, this rule has governed my use of it:

> Inject a first dose of 1 mlgr.; a second dose of 5 mlgrs., given two days after the first dose; a third dose of 10 mlgrs. given two days after the second dose. If any rise of temperature occurs after any one of these doses, that same dose is to be repeated. A second reaction from any one dose counts as positive evidence of the presence of tuberculosis; absence of reaction after all three doses counts as negative evidence.

Mention of differential diagnoses between tubercular disease and other diseases which sometimes simulate it, and affect the lungs, is purposely omitted, because I believe the physician who follows the steps already stated will very rarely be at fault in his diagnosis. It certainly happens, now and then, that the first observed indication of the presence of tuberculosis of the lung is an outburst of hæmorrhage, more or less severe. Sometimes the hæmorrhage is measured by many ounces, sometimes it amounts to the merest speck of blood. I have never seen hæmorrhage from a congested throat. We are all familiar with the frequency of the remark, "Yes, I did bring up a little blood by coughing, but I thought it came from my throat." Not seldom the patient's doctor is quoted as having mentioned the patient's throat as the source of the hæmorrhage. I am sure there is practically never bleeding from the throat,

unless there is to account for it a very obvious local lesion. To all these cases of suspicious hæmorrhage, let the tests already enumerated be applied, and there will be no difficulty in saying, with reason, the patient has or has not tuberculosis.

So much for the important subject of the early recognition of cases of tuberculosis of the lungs.

Now I turn to the second point in the title given by the Committee to this discussion—"The Isolation of Pulmonary Tuberculosis." I confess this part of the subject somewhat puzzles me, because I do not know with exactness what is meant by isolation as it stands in the title of this discussion. I have asked certain of the powers that be to define the word in this connexion, but I have had a sort of go-as-you-please instruction sent me in reply to my question.

Well, had we at present in this country, let us say only 100 cases of tuberculosis, no one would, I apprehend, hesitate for one moment as to what should be done with these 100 invalids. There can be no doubt they would be forthwith isolated, in the severest sense of that phrase, from the healthy community. In such circumstances it would, in my judgment, be a criminal act to allow these 100 infected persons to remain, on any terms, among or near to healthy people. Now the logical inference following from this treatment of 100 infected persons, may seem to some to justify a certain measure of severity in the attempt to deal with the wide-spread danger on all sides threatening the healthy community with this the most fatal and most prevalent of communicable diseases. It is most comforting to know we often do not act on logical inferences. In the meantime, I take it, the feeling of the people of this country is decidedly against severe measures of any kind being enforced in connexion with the prevention of tuberculosis. For this reason alone, and in spite of what I am ready to admit is the sound logic of those who look upon this question from a purely disease-preventing point of view, I would do all I could to prevent compulsion in any shape being enforced upon living victims of tuberculosis. The money cost of thoroughly carrying out efficient measures of compulsion in this connection would be enormous. It is certain we have in this country about a quarter of a million persons who are suffering from tuberculosis; almost certainly there are a good many more than that number. Now, it seems to me it would be utterly wrong for the Sanitary Authority, or any other Authority, in this Kingdom, to have it in its power to say to a tubercular person: "You are a danger to the healthy community, because the disease that affects you spreads by infection among healthy people and therefore we put you under these and those

restrictions"; unless the Authority empowered to speak in this way, besides having a very strong public opinion at its back, was also empowered to feed, clothe, and house in suitable comfort those with whose liberty of action it proposed to interfere, for the sake of the public weal. This, it is not necessary to point out, would mean a very large expenditure of public money; and, I think, it would also be incumbent upon the nation to educate the children, and, within reasonable limits, to provide for the wives and children of tubercular persons, who, in the public interest, were forbidden, very often for years on end, to work at their callings. If this also is regarded as a sound view of the nation's responsibilites in this matter, another large addition to national taxation must be suffered by the Kingdom. It is, I venture to believe, impossible to doubt that with their present knowledge of the facts, our taxpayers would turn out any government which proposed legislation going in the direction of what is meant by compulsory notification of the existence of tuberculosis. Whether or not these are the strongest and the best arguments to advance against compulsion in this matter, is not, I think, the question now before us; but it seems to me beyond reasonable dispute, they are arguments which, for the present, practically close the question of the compulsory notification of tubercular disease; and so long as they weigh with the public as heavily as they do now, it is mere waste of time to urge the adoption of compulsion, in any shape, upon the notice of the country. What then can we do, without even semblance of compulsion, to ensure to the people the benefits we believe would be derived from the isolation of consumptives? In this connexion let us keep clearly in view the fact, that the death-rate from tuberculosis has fallen in the last half-century by one half. The fall in the death-rate from this cause is, apparently, still progressing. We know this is not due to Koch's discovery, because the fall was well established long before 1882, when he published that masterpiece of modern pathology. But it was household sanitation, and the beginning of the appreciation of the value as health-givers, and health-preservers, of sunlight, and fresh air, and cleanliness in our dwellings, that first caused the fall in the death-rate of tuberculosis. It is the increased value of these boons in the public estimation of them, helped by Koch's teaching, that will make still more marked the fall in the death-rate.

Some years have passed since first I ventured to suggest, that the best plan by which we could successfully fight against infective diseases of all kinds, and especially against tuberculosis, would be to make the study of the ways of infection a part of the education of every boy and girl. I can see no

reason why this should not be done in our rate-supported schools. The instruction could be given near the end of the pupils' school days; and competent teachers could make the study of the laws that regulate the spread of infection sufficiently interesting, and easily understood, to ensure the scholar of average intelligence obtaining a useful working knowledge of these laws. Were this done, the people of England would in the course of 10 years, or perhaps in less time, know the need there is for preserving themselves from the attack of preventable diseases; and they would also know how to set to work to have this done with thoroughness.

Out of evil good often comes. This is, I think, well illustrated by what I regard as one of the most useful lessons yet taught us by the recent triumph of the Anti-Vaccinationists over the trained intelligence of the country. An uneducated public opinion was manipulated by astute persons, who knew how to deal with it for their own ends. It has been shown again and again, that ignorance, and the prejudice it entails, are among the most dangerous enemies of real progress in medicine. Let, then, this lesson bear its first fruit, by teaching us that the first step to take in our fight against preventable diseases, is to make sure we carry with us a properly educated public opinion. Assuredly we shall fail to accomplish our ends if we have not in our favour a solid public opinion, which knows its wants, and means to insist on having them. Therefore, let us put in the foreground of our programme that old cry of a bygone day, "Educate, educate, educate."

Meanwhile we must use the means we have at hand, and inculcate, as regards the prevention of tuberculosis, the destruction of the patient's sputum, and the disinfection or destruction of his infected clothes and belongings. We can, to a material extent, persuade the consumptive to refrain from spitting except into a properly constructed receptacle. In short, we can teach patients to do those things that are familiar to us all in these days, and about the practical usefulness of which there is a remarkable unanimity of opinion among medical men all over the world. In this way, and in this way only, I believe, can we with advantage to-day do anything useful in the direction of isolating from the healthy community, not the consumptive himself, but his disease.

In the present state of feeling in the country, compulsory isolation of consumptives will not be permitted. But every reasonable measure tending to isolate the disease the consumptive carries about with him, will be everywhere welcomed among educated people. It is in this way sanatoria for all classes should, in my opinion, be chiefly useful; for there consumptive

should learn how to treat themselves, both to their own good, and to the good of the healthy population.

Above all, let us secure the education of our children in the laws which govern the spread of infective and therefore preventable diseases, with special reference to the most fatal of them all, Tuberculosis of the Lungs.

[*This discussion applies to the papers by* Dr. F. R. WALTERS *and* Dr. G. A. HERON.]

Dr. A. H. JACOB (Dublin) said that he had gone a good deal into the question recently and got as many of the statistics of sanatoria as he could, and he was profoundly impressed with the fact that a system of compulsory isolation was absolutely impossible under the present aspect of affairs. At a sanatorium recently established a few miles from Dublin, he found that the maintenance of 24 beds cost the sanatorium last year £3,195, or at the rate of £133 per bed; and, although everything was as nice as could be, there was nothing luxurious or extravagant. Then, on those statistics which he had been able to obtain, he went into a rough calculation as to what it would cost to do what the compulsory infectious isolation men desired, and he came to the conclusion that it would cost the taxpayer nine million sterling a year. He ventured to agree with the author of the paper that any such proposition would have the effect of extinguishing for a decade or two decades any chance of establishing isolation hospitals in this country.

Dr. J. GROVES (Carisbrooke, I.W.) said it was most desirable that this subject should be taught in all schools. It was, no doubt, impracticable to treat all consumptive patients in sanatoria; but such treatment was absolutely necessary in many cases, and there should be sanatoria started by the public authority for educational purposes to show people how to go on in their own homes, what sort of homes to live in, and that it was better to live in the open than in the slums. The medical officer of health ought to know wherever phthisis existed, and the sanitary authority ought to be informed about the dwellings and the condition of the patients, and without obtruding very much, an inspector could go in and put things straight and give the patient a better chance, and might also leave such admirable suggestions as Dr. Newsholme had issued at Brighton. He thought the majority of people would read those suggestions very carefully, and if that sort of attention were given throughout the country they would do a great deal of good. With reference to the rising generation, surely this subject of public health ought not to be neglected as it was. They ought to impress on the county councils, who were wasting money hand over hand in so-called technical

education—teaching women how to make their own frocks, and how to trim their own bonnets, and how to cook entrées, and so on—that they ought to be teaching the children in the schools the primary laws under which they lived and moved and had their being.

Dr. W. Donovan (Erdington, Birmingham) said he quite agreed with what Dr. Groves had said as to the expediency of the County Councils spending more money in teaching sanitation: he was a member of a County (Warwickshire) Council, and he had had rather an up-hill fight to get the Sanitary Committee of the County Council to consent to distribute the leaflets which had been recommended by the Society for the Prevention of Tuberculosis.

Dr. H. Scurfield (Sunderland) said he thought that a large number of medical men did not really appreciate the results which could be obtained in sanatoria, and the results that had been obtained in the German sanatoria, conducted on the lines of hygiene, the main principles of which were the provision of practically con-continued residence in the open air, an abundant dietary, and the strict regulation of rest and exercise. There was a vast difference between having medical men of experience in the treatment of cases of consumption resident on the premises to see that the treatment was carried out, and simply giving patients a leaf of instructions. A small sanatorium, for a comparatively big town, would do a great amount of good. A small sanatorium with one resident medical man seemed to him to be much better than a large one with several resident medical men. In a sanatorium accommodating say forty patients the resident medical man was able to thoroughly master each case and individualize in his treatment, and the strict régime prescribed was much more likely to be carried out.

Dr. G. A. Heron (London) said the proposal was briefly: There were a large number of senior medical students throughout the country well able to teach the rudiments of sanitary science. There was also a large number of medical men who, to put it delicately, were not too busy, and they would, he thought, gladly give their help in this matter. He did not, he said, wish to put upon the medical profession another unremunerative service. Doctors already did far too much work for no pay. He meant that these teachers should be paid for their work, and properly paid. In that way, there would be found a large number of efficient teachers to set the thing going; and as they dropped out other properly educated teachers would take their places, not necessarily from the ranks of the medical profession. Dr. Heron said he proposed to deal elsewhere at greater length with the details of this scheme, because he believed it was a valuable one, and could be usefully carried out for the public benefit.

"*Venereal Disease*," *by* Col. C. W. Long, M.P.

ABSTRACT.

Approaching this question from the point of view of the Public Health, and the constitutional stamina of our race, the first question which presents itself is this.

Is venereal disease sufficiently prevalent and sufficiently dangerous in its character to demand special consideration? Or, is it so small an evil that we can afford to ignore it?

In the past there have been various official enquiries into this subject, they have all recognised the grave consequences of the disease, and although among those who are specially engaged in combating the evil, there are some few who think that through the operations of advanced knowledge it is diminishing, nevertheless, I think it is correct to say that the great mass both of medical men and nurses throughout the country, are convinced that the evil produced by the disease is very great and very far reaching.

Under the light of modern science, treated promptly and properly, these diseases can be cured; yet more than 2,000 persons die annually from the diseases themselves, and an unknown number from diseases which are in reality the effects of venereal; for it must be remembered that this cause of death is entered in no death certificate if it is possible to avoid doing so. Moreover, diseases are handed on to posterity not only in the form commonly known as congenital, but in many varied forms of constitutional weakness, physical and mental.

Is this inevitable?

Foreign nations have endeavoured to deal with the problem in a manner which, while it cannot claim entire success, has its own very grave drawbacks, and our own experiments on similar lines were embodied in the old Contagious Diseases Acts, which were eventually repealed.

Those Acts interfered with personal liberty in the gravest way and in a manner contrary to the spirit of English law, inasmuch as they applied to one section only, and they were contrary to the feelings of the English people, because there was contained in them the principle that vice may be recognised and licensed by the State.

But does it follow that because the first effort to deal with a great evil failed, therefore we are in despair to sit still and make no endeavour to deal with it? In these days we take broader views as to the public responsibility for the public health; and the advance of medical science, by showing how the diseases can be efficiently dealt with, has altered some of the factors in the problem.

Mr. Simon, in the year 1868, reporting to Government on the desirability of dealing with the question of the disease among the civil population, recommended that no steps should be taken; and he brought forward as a powerful argument in favour of his recommendation that the State took no steps to ensure correct weights and measures, and that the State did little to prevent the spread of infectious diseases.

That argument has long ceased to be true, and it is now recognised that it falls within the scope of the duty of the public authorities to endeavour to mitigate public evils. May it not be possible to take steps to prevent the spread of the disease without unduly interfering with personal liberty and without licensing vice?

During the last few months certain memorials have been forwarded to Lord Salisbury, asking for inquiry into existing circumstances and possible lines of action. The first was signed by various ladies, by certain professional men, and lastly, by certain gentlemen whose names carry weight on such a subject. Amongst the ladies were well-known rescue workers, matrons in hospitals and workhouses, district nurses, lady guardians, and members of girls' aid societies.

The list of men contained names of distinguished medical gentlemen practising both in London and in the Provinces, and also recorded the opinions of men who, taking very different views on many subjects, are yet all united in considering the subject of this paper one of the greatest importance, and one demanding the serious consideration of the State.

The other memorials forwarded were from the Royal College of Surgeons in England, the Royal College of Surgeons in Ireland, and the British Medical Association. These showed what was the view of the medical profession as to the importance of the question, and as to the possibility of doing something to mitigate the evil after due consideration.

The memorials to Lord Salisbury asked for inquiry because those who signed them believed that lines of action could not be laid down without further investigation, and believing that, they indicated no special lines of action, but they were quite prepared to suggest lines of inquiry.

For instance: First, To substantiate that the evil is great enough to come under the head of a public evil.

Secondly, To collect information as to the present opportunities of treating venereal disease, and as to how far these exist at present through hospitals and dispensaries.

One of the advantages of the old Contagious Diseases Acts was—that it made treatment possible for persons who were ready to be cured, and greater facilities for proper treatment

are much required for certain classes—these facilities ought to be provided gratis, partly by charity, partly by Poor Law.

Thirdly. To collect evidence of the various forms of venereal disease and other diseases and constitutional defects which spring from hereditary contagion.

Let me point out here that these suggestions come from the British Medical Association, and shew that great as is the knowledge on the subject, that knowledge requires opportunities for application in order to really protect the public.

I would concentrate your attention on the necessity of official enquiry so as to have the light of modern thought thrown on this dark subject, in the hope that at least greater facilities for cure may be arranged.

In a majority of cases these diseases taken at once can be treated as out-patient cases.

One modern system of cure for syphilis in its first stages is a system of mercury vapour baths and other forms requiring certain paraphernalia and skilled application which the working classes or even clerks and young fellows at home could not well afford or arrange for.

It would be an advantage if all Poor Law infirmaries and hospitals had the necesssary arrangements for the thorough treatment of out-door patients.

The working-classes again are free only in the evening, rules might be altered so far as to allow out-patients under treatment to come by appointment for cure in the evening.

Then there ought to be such relaxation of the law of libel, which is very strong as to venereal disease, so that while medical men should still be liable if they divulged private information obtained in the course of their practice, they should yet be in a position to take action which would render interference possible (perhaps through some public authority), with a view to ensuring precautions being taken against danger to the innocent.

It is believed that this could be done without divulging names, except in cases of special danger to others.

It ought to be considered also whether the direct temptation to vice in the streets of our large towns cannot be better controlled, even though it cannot be entirely prevented. This is better managed in some Scotch towns under Scotch law than in England.

This being a paper to be read before a Sanitary Association, I have confined myself to the health aspect of the question, but I do not for a moment lose sight of the moral side, or of the deep obligation to seek out that which is lost.

Dr. A. Jacob (Dublin) said he represented the Royal College of Surgeons, Ireland, and he desired to say that the memorial, in the sense which Colonel Long had referred to, was adopted quite unanimously by the Council of the Royal College of Surgeons, and there was practically no second opinion in the College on the subject. Colonel Long only asked for an enquiry which was necessary for the guidance for legislation. He did not agree with the statement that the Contagious Diseases Acts were a failure. He studied those Acts in the Curragh Hospital, close to the great camp, where he saw a great deal of that sort of thing, and he read up the Acts and worked out the points thoroughly, and the conclusion he arrived at was that the statement that the system had inflicted injustice on innocent women was entirely illusory. He did not succeed in finding a single such case in that district, which was continuously populated with loose women of an objectionable class. He did not find a single case in which an innocent woman had been exposed to inconvenience under the Act. The reason was that the Act hedged round the individual with all sorts of protections, and the police that were in the working of the Act had no power or authority to take up anybody and cause them to be examined, or to do anything else until they had taken several preliminary steps to protect the character if the person were innocent. The real fact was that the the existence of a proper system for dealing with venereal was not a question of the propriety of it at all. Every medical man, every scientist, every army commanding officer was agreed that something was necessary to be done to preserve the military and civil population from the inroad of venereal. But there was the party, represented, as it had been of late, by the anti-vaccinatists and conscientious objectors, which prevailed. It was not the difficulty of persuading the people of the advantage to be gained. These people did not want to see any advantage; they did not want to enquire; they said it was the privilege of the free Briton to have this disease if he liked to, and that it would be flying in the face of Providence to check it, and they would not have it. He trusted that Colonel Long's efforts would so arouse public opinion that these people would be forced to look at the question from a moral and proper business point of view.

Mr. A. Weekes (Hurstpierpoint) said none knew better than the President of the Section how terrible the state of the British Army in India had been. He agreed with the last speaker. He had to get up a Lock Hospital in India in connection with a British regiment and battery when he was in civil charge of a district, and no evil resulted from it—and in his opinion incalculable good; but he advocated moral prevention as well.

Inspector-General Macdonald gave an instance of the successful working of the Act.

Colonel Long, M.P., said the speakers had referred to the old Contagious Diseases Act. He had never seen the old Act working,

but some who had worked them no doubt supported their return. He had not heard anything to contradict what he had said in his paper that there was in the old Contagious Diseases Act something that was contradictory to the ordinary law of England, inasmuch as they applied to a very small section. Nor had he heard any contradiction of the statement that English feeling was opposed to any idea of State-recognised vice. If it were impossible to bring back the old Contagious Diseases Acts—and, from what Lord Salisbury told him, it was—would it not be well to do something which would, at all events, mitigate the evil?

"*The Educational Factor in the Vaccination Problem, and its relation to the securing of the best standard of Vaccination, public and private,*" *by* ALBERT E. COPE, M.D., D.P.H.

(MEMBER.)

AT present Tubercle and Plague loom large in the public eye; Small-pox and Vaccination, after a period of Parliamentary prominence, have been, for a time, relegated to a position of less importance; the more easily, perhaps, because last year only five cases of real small-pox were recognized in the area under the administration of the Metropolitan Asylums Board, which, however, maintains hospitals and ships for the reception of small-pox patients, at a total cost which last year exceeded £40,000.

But, although we have not small-pox always with us in a seriously epidemic form, we know that it is very loth to leave for long together, and the occurrence of outbreaks such as those at Gloucester, Middlesborough, and now at Hull, emphasize the necessity for a well-organized and strenuously-maintained resistance to its inroads.

We are concerned to-day with the standard of vaccination, and, as in every other investigation, it behoves us first to define our terms.

What do we mean by the best standard of vaccination?

Not the *legal* standard—indeed, a legal standard can scarcely be said to exist when, as regards the community, the conscience clause gives the opportunity of wholesale contracting out of vaccination, and, as regards the individual, the only legal requirement is that his vaccination should be "successful," this word remaining without definition, and embracing success of every degree, good, bad, and indifferent.

The *official* standard only differs from the legal in the imposition of regulations as to the performance of public vaccinations.

"In all ordinary cases of primary vaccination, the Public Vaccinator must aim at producing four separate good-sized vesicles, or groups of vesicles, not less than half an inch from one another; the total area of vesiculation resulting from the vaccination should not be less than half a square inch."

"Vaccination should at every stage be carried out with aseptic precautions,"

the scope of which is defined in subsequent clauses of the Instructions to Public Vaccinators, from the Third Schedule of the Vaccination Order, 1898.

These restrictions, however, only apply to vaccinations performed by public vaccinators, and at the expense of the public, the proportion of these to the total numbers of successful vaccinations being shown, for a series of years, in the accompanying chart, facing page 548.

Taking the year 1895, about 66 per cent. of the registered births were accounted for as successfully vaccinated, about 38 per cent. being by public vaccinators, and 28 per cent. by private practitioners.

Our standard of vaccination should be that system which, in conjunction with isolation and disinfection, will prevent the epidemic prevalence of small-pox.

There are three chief difficulties, which stand in the way of our realising this ideal.

1. The first is the failure to recognize the need for general re-vaccination.

2. The second is the imperfection of much which is certified as "successful vaccination."

(a) This imperfection may be *accidental*, arising either from the inactivity of the lymph employed in vaccination, especially during the hot months of the year; or from the use of too strong antiseptic applications to the vaccinated surface. It is important to notice that, while we have a standard of vaccine lymph bacteriologically—namely, a lymph which has been kept in contact with sterile glycerine solution for four weeks, yields no colonies of organisms on plate-cultivation, and is yet active for vaccination purposes—we are still in some doubt as to the conditions which cause variation in the degree of activity of the lymph so obtained, and—to take a word from the chemist's vocabulary—need that the lymph should be biologically *standardized*, so as to be uniform in its results.

(b) Another imperfection may very properly be described as *avoidable*, is that vaccination which aims at pro-

being the minimum of vaccine result, compatible with the signing of a certificate of success of the operation. The statistics of Marson, Gayton, and the various medical men who have investigated recent epidemics, fully justify the findings recorded in the paragraphs [illegible] of the Royal Commission's Final Report:—

"Upon the whole, then, the evidence appears to point to the conclusion that the greater the number of marks, the greater is the protection in relation to smallpox enjoyed by the vaccinated person. This further indication seems to be afforded, that, whilst the distinction in this respect between those with one and those with two marks is not great, there is a very marked contrast between those with four, or even with three marks, as compared with those with either one or two."

After such an expression of opinion, one would hope that "one-mark vaccination" would soon cease to exist.

3. The third fact which at present denies us the realisation of our ideal, is the existence of a "conscientious objector" as well as a "vaccinator." May we not go a step further, and draw attention to the remarkable attitude of those who say that they "conscientiously object" to claim the relief which the law [illegible] "conscientious objection" to vaccination.

On these three grounds, then, our present system is inadequate, and it is important that we should be clear as to the conditions which are necessary to the establishment of an [illegible] standard of vaccination.

[illegible] there are six conditions, at least, which should [illegible] such standard.

[illegible] vaccination in infancy, or before entering [illegible]

[illegible] in the twelfth year, or before [illegible]

[illegible] and inspection of children in [illegible] periodically or during epidemics of [illegible] such hours as shall not interfere with the [illegible] for the purpose of ascertaining and recording the state as to vaccination of each child, and with [illegible] offering to vaccinate all those whose vaccination appeared to be imperfect.

The Education Department and the School Boards are very jealous of any interference with school hours, and the State elects to rely rather on moral suasion

than on compulsion, with the deliberate intention of increasing the amount and improving the conditions of vaccination, the State should do everything possible to promote such inspection as is here suggested.

Fourth.—The affording of every facility and inducement for adult re-vaccination, especially in presence of small-pox.

Fifth.—The adoption of the principle of temporary suspension of vaccination, in place of the total exemption from the operation at present granted by the conscience clause.

Sixth.—The retention of the Local Government Board official standard of individual vaccination.

How is the standard thus outlined to be obtained?

There is only one answer to this question, an answer which has been emphasized by Dr. Bond, of Gloucester, in the formation of the Jenner Society, whose "first object is to commemorate the name and work of Edward Jenner, M.D., of Berkeley, in the County of Gloucester, and *to bring home again to the mind of the nation*, in a time of growing forgetfulness of his great discovery, the immense benefit he conferred by it upon mankind."

An answer, again, which was specially enforced in the closing words of Dr. McVail's powerful address at Birmingham last year.

"In this country a vaccination law such as that of Germany seems, in the present state of public opinion, impossible. *The public have to be educated*, and they must pay for their education. In so far as they will accept no other schoolmaster than small-pox, their education will be all the more costly, but the lesson once learned will be all the more thorough. The pity of it is that this schoolmaster accompanies his teaching by punishment, and that the punishment so largely falls on helpless children. But it has always been the case in matters physical, intellectual, and moral, that the sins of the fathers are visited on the children."

The only hope for our realizing an efficient standard of vaccination is systematic, organized education on the subject. It is my deliberate opinion that the future of vaccination in this country largely depends upon the thoroughness with which, in the next four years, we bend our energies to a plain and unmistakeable presentation of the truth about vaccination, and a persistent warfare against the misrepresentations—if not worse—of the anti-vaccinationists. In proportion to the thoroughness with which we press home facts about small-pox

and its prevention shall we obtain the maximum amount and the most uniformly high quality of vaccination.

In the past we have largely depended upon authority in our vaccination legislation, to the practical exclusion of any organized attempt to teach the people; we must now recognize the change in political conditions, and the awakening of democratic instincts, and to succeed must "educate the democracy."

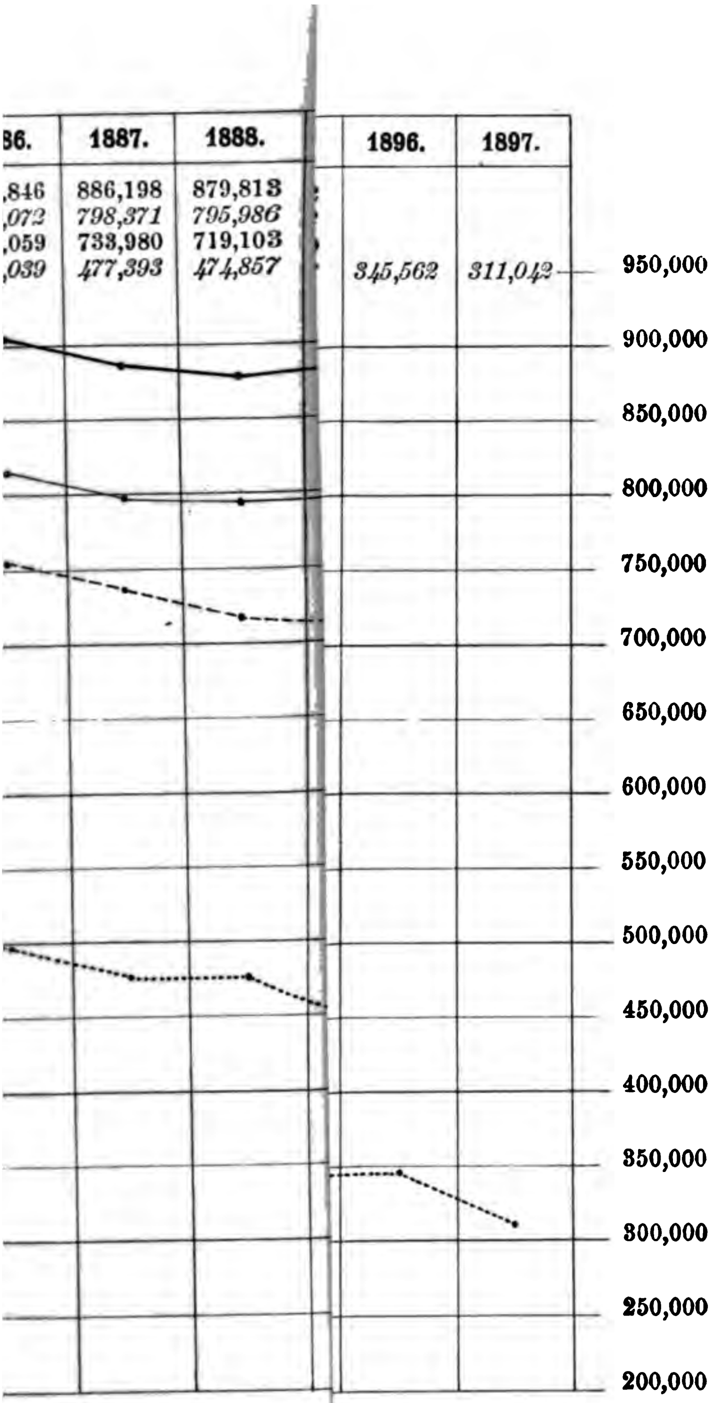
How is tuberculosis to be stamped out? Only by letting education go hand-in-hand with legislation.

How is small-pox to be destroyed from our midst? Only by a like propaganda.

The education, to be complete, must embrace the training of the medical profession as well as, and even before, the enlightening of the public. It is scarcely necessary to say much on this topic. There is need, however, for some more adequate clinical teaching in regard to small-pox. The Metropolitan Asylums Board allows students to spend a fortnight on the small-pox ships on certain terms, but it would be wise, in case of an outbreak of small-pox, for notice to be given to the authorities of the Medical Schools, who might then form small classes to go down to the ships for a day for clinical demonstration, as is now done sometimes in the case of qualified men. There should also be facilities afforded for visiting the National Vaccine Establishment Lymph Collecting Station, and the Vaccine Laboratory, so that the student might obtain some practical acquaintance with the methods employed.

In addition it is very necessary that every student should have some idea of the anti-vaccinationist statements, and the way in which they have been met and refuted. The point to be emphasized is that authority will no longer take the place of accurate teaching. The education of the medical man in vaccination matters becomes a question of paramount importance when we consider that it is largely through the medical profession that the education of the public is to be secured. The Medical Officer of Health has done much in this direction in the past, and has largely helped to form and direct public opinion by reports to sanitary authorities, by local lectures, and by collective memorials.

The Public Vaccinator, under the new conditions, has an unrivalled opportunity for playing the part of health missionary, and to my mind the domiciliary vaccination will do more to break down prejudice in regard to vaccination than anything else. What friction exists between the public vaccinator and the private practitioner should be obviated if each would act toward the other as he would wish the other to act toward him. The question, however, will become a pressing one before the



calendar year from 1872. ar year from 1872.

ates, at all ages, *for years ending*

end of the five years as to whether in some districts there should not be power to appoint a Public Vaccinator, who should be independent of private practice.

The Medical Officer of Health and the Public Vaccinator have respectively the Sanitary Inspector and the Vaccination Officer associated with them in their work, and it is very necessary that these should have every opportunity of rendering themselves familiar with the facts about small-pox and vaccination.

In what directions is work being done which touches, or can be made to touch, this question of educating the public?

The National Health Society heads the list of organizations which have recognized the importance of such an educative policy, and by literature and lecture attempted to inform its agents, and through them the public, in Mothers' meetings, Girls' Friendly Society gatherings, County Council lectures, and by similar methods, as to general hygienic requirements, and in particular in regard to small-pox and its prevention.

The St. John Ambulance Association has recently inaugurated a "Home Hygiene" course, and issued some 150 certificates after examination.

The text-book by Dr. Sykes contains an admirable little *résumé* of vaccination information of a popular character, and this course of training distinctly provides for teaching on this question.

The various County Councils have courses of Lectures and Demonstrations on Domestic Hygiene and on the Management of Children.

The Evening Continuation Schools make similar provision, and one course which has proved very popular in London is on "The Duty of the Citizen," but no reference is made in the syllabus to the duty of the citizen to make up his mind on the vaccination question.

Hospital nurses of course are well provided for in their present courses of training, but there is one class, at present almost neglected, to whom it is of the utmost importance to give accurate information, namely, the teachers in our elementary and secondary schools. It would be easy to arrange for lectures on hygiene in the various Training Colleges for Teachers, and in any such course there should be room for the consideration of vaccination.

It is interesting to note that the Sanitary Institute holds an examination in practical hygiene for school teachers; and also, that while hygiene has become a science subject for the certificate examination of female elementary school teachers, it is not yet included in the list for men

Leaving, however, this field, there is that of literature and the press to be yet occupied. The Jenner Society has done splendidly in the hands of Dr. Bond, but needs more support in its arduous and sometimes, we fear, thankless task. Mention should be made also of the little pamphlet, "Facts about Vaccination," issued by the British Medical Association.

By lecturing, also, much good has been done, and Mrs. Garrett Anderson has recently caused a good deal of stir in the anti-vaccination camp by the effective use of this weapon, as well as by a valuable letter to the *Times*.

The anti-vaccinationists are fully alive to the importance of advertising their opinions, if they are to meet with any success at all.

How are we to spread our views, and in particular what can the Sanitary Institute do in this respect?

Can it become the centre of an anti-variolous propaganda, a crusade against small-pox; if so minded, co-operating with, or even entering into closer relations with the Jenner Society?

Can it supply lecturers on this subject, and provide them with any necessary lantern slides and diagrams?

Are there any gaps on the shelves of its library which might profitably be filled up with a complete literature of vaccination?

Is it possible for it to help in the filling of any *lacunce* in the literature of the subject, by assisting in the publication of a popular digest of the Royal Commission's Report, or a more or less complete index to the numerous volumes in which they are contained?

These are some of the lines on which I believe the Institute could materially assist in the solution of this intricate question.

I would venture to suggest, as the practical outcome of this paper, that the matters discussed should be referred to the Council for their consideration, and for the taking of such action as may appear desirable.

In the meantime, we must remember that vaccination is only one subject among many; that it is a part of hygiene, not hygiene itself; and yet, that, as a decision in regard to it has to be made by every parent, and should be made by every person in a position of influence and responsibility, we are bound to give all the information and guidance we can, in order that right judgments may be formed on which right actions may be based.

Dr. J. Groves (Carisbrooke, Isle of Wight) said he felt very strongly, as a medical officer of health, as to the difficulty of the general practitioner being supplied with vaccine. The Local Government Board absolutely refused to supply anybody but the Public

Vaccinator: they would not supply the Medical Officer of Health. He would have, in a case of small-pox, to send the Inspector to disinfect, without being able to vaccinate the patient first. The profession ought to be informed where lymph of a perfectly reliable character could be bought, if Government would not supply it to them. Thanks to the Member for Southampton, and it was to his credit to have taken the trouble, enquiries were made of the President of the Local Government Board in Parliament as to what was to be done. The President of the Local Government Board simply said he did not know, he only knew the Government of this country were not going to the expense of preparing sufficient vaccine for all practitioners. Another point which had been brought before him in his district was that in the summer-time vaccination failed very much more than at any other time. He did not know whether any explanation could be given of this fact, but he had proved it over and over again, with children who had been vaccinated both from the glycerinated lymph from the Local Government Board and from other sources. He believed in Germany vaccination was not done in the hot months of the year.

Dr. Charles V. Dingle (Middlesboro') said he wanted to know why the experimental stage should have lasted so long; why vaccination, the only real remedy against small-pox, should not have been taken up thoroughly. Who was to blame for this? He thought the medical men in the country. He did not think the population themselves were half so much to blame as the general practitioners, who, in the past, had conducted vaccination in a manner which they must have known was inefficient. He thought the able paper by Dr. Cope contained several points which ought to be taken up by that meeting. A public vaccinator should be a man who did not take up other work. He should have a district and be paid for it in much the same way as a medical officer of health, and he thought probably the medical officer of health would, at the present time, be the right man to undertake this work.

Dr. Pryce Morris (Halesworth) said that one point in the paper just read appeared to him very worthy of remark; he had never heard it mentioned before, but nevertheless he thought it an extremely valuable suggestion, and that was that a biological standard of lymph should be ascertained before it was sent out to the medical practitioner and public vaccinator. He also considered what Dr. Groves said accorded exactly with his own experience, that the lymph in hot weather had not proved nearly so efficacious as in the cold. It was not only his own experience as a public vaccinator, but also that of several other medical men in his neighbourhood. He begged to thank Dr. Cope very much for his paper.

Dr. F. T. Bond (Gloucester) said he had risen because he wished to express his own personal feeling, and he was sure he might say the feeling of the Executive Committee of the Jenner Society, that they would be only too happy if the Sanitary Institute or any other

body would co-operate with them, or, if they thought it desirable, to allow them to transfer the work they had been carrying on into the hands of the Sanitary Institute. It was undertaken by the Jenner Society for two reasons—because they thought it was urgently needed, and because circumstances seemed to point to Gloucester and Gloucestershire as the source from which a movement of this kind might very well be started. Gloucestershire, he need not tell them, was the birth-place of vaccination, and at the same time the scene of the greatest lesson given to the country in this century as to the result of its neglect. The Society had carried on the work as best they could. It was a very great work, one which he felt personally to be beyond his own physical capabilities, and he was extremely anxious for that reason that they should see their way clear to perpetuate it under conditions which should prevent all possibility of its falling to the ground. There was only one remark he would like to make on one point in Dr. Cope's paper, and it was this: he did not think Dr. Cope alluded to the subject of vaccination certificates. The vaccination certificate really lay at the bottom of a good many difficulties to which reference had been made. At present the only information that the vaccination certificate gave was of the fact that a child was successfully vaccinated. It did not indicate in the least what was the character of the vaccination, and until that was done they would never make satisfactory progress in impressing upon the public, and he hoped also upon the medical profession, the need for the very great improvement in the character of vaccination to which Dr. Cope referred. The Jenner Society approached the Local Government Board some time ago with a view to ascertaining whether it was possible to get the vaccination certificate reconstructed, but unfortunately it appeared that could only be done by fresh Parliamentary powers. The Local Government Board themselves were advised they had no power to do it by Order, and therefore it must stand over. Unfortunately he was afraid some time must elapse before that and other urgent requirements of our vaccination administration could be dealt with by Parliament. He cordially supported everything that Dr. Cope had said.

Dr. W. R. Hadwen (Gloucester) said that there were four main points in Dr. Cope's paper which he thought needed strongly emphasizing. The first was the admission that medical men required educating upon the vaccination question. His own experience was that there were very few medical men who knew anything at all about it. The second point Dr. Cope had maintained was that medical men ought to acquaint themselves with the arguments of the anti-vaccinators, and these in his (Dr. Hadwen's) opinion were precisely what they did not understand. John Stuart Mill had said that "man who only knows his own side of a case knows very little about that"; and they might rely upon it that unless a medical man makes up his mind to study anti-vaccination literature he would never understand the vaccination question. The third point Dr. Cope had touched upon was this, that vaccination ought not to be

dissociated from hygiene; a suggestion he considered most important. Many medical men had been making vaccination the one and only factor in the consideration of small-pox, instead of realizing, as Dr. Cope had pointed out, that there were other factors in the ætiology, prevention of, and protection against small-pox. The fourth point Dr. Cope had impressed was, that medical men ought to possess accurate information upon the subject. Therefore he would ask them not to take the statements in the literature of the National Health Society, nor yet those published by the Jenner Society for granted, but just take care that the statements contained in those papers were tested and proved to be accurate before acceptance. Another point: the first essential in the education of a medical man upon vaccination was not answered by Dr. Cope, namely, "What is vaccination?" That question had never been answered yet. It was time that a scientific basis was found for the generally accepted creed. The very fact that last year, as Dr. Cope told them, there were only five cases of small-pox in the whole of London, and that during that time there was a less amount of vaccination than had ever been known before since the passing of the Compulsory Vaccination Act, showed rather conclusively that vaccination was a very small factor in the question of small-pox. Dr. Cope had remarked that a most essential feature in the consideration of small-pox was the prevention of epidemics. But he had omitted to tell them how vaccination behaved itself in relation to this aspect of the question. He would therefore supply the information. In the epidemic of 1857–9 there were more than 14,000 deaths from this disease; in the epidemic of 1863–5 the deaths had increased to 20,000; and in 1871–2 they totaled up to 44,800, and that, be it remembered, after twenty years of compulsory vaccination. Surely this did not look as if vaccination had done much towards the diminution of small-pox epidemics. But it might be urged that the increase was accounted for by the increase of the population. Now the population between the first and second epidemics had increased only 7 per cent., but small-pox deaths had increased 41 per cent.; between the second and third epidemics the population had increased only 9 per cent., but small-pox by 120 per cent. That was at the end of 1872. In 1875 the great Public Health Act was passed, and since definite sanitary laws have been enforced throughout the country, since they had had Medical Officers of Health and Sanitary Inspectors in every part of the kingdom, the disease of small-pox had steadily declined, until, except in insanitary areas, it had become almost an unknown quantity, and in the great City of London last year only five cases were recorded. This decline, as he had pointed out, was coincident with the decline, and not with the increase, of vaccination. Dr. Cope had remarked upon the necessity of a four-mark vaccination, without which efficiency could not be secured, but he did not explain how it was that all Jenner's miracles were accomplished with only one mark, which the inventor declared would protect for a lifetime. Moreover, Dr. Cope had forgotten that by the drastic Prussian law of 1834 every healthy male adult in the kingdom was vaccinated in

ten places on each arm, and yet in 1871–2, after thirty-five years of this rigorous twenty-mark vaccination, Prussia lost 124,978 of her vaccinated and re-vaccinated citizens, the majority of whom were composed of the adult male population. What then was the value of a four-mark vaccination?

Councillor COHEN (Hull) said that in his early days three out of twelve persons they met—fine women and men—were marked with small-pox. Vaccination had diminished the danger of small-pox. Walking along the streets now they could see how free persons were from its ravages. He was a member of the Hull Board of Guardians, and believed thoroughly in vaccination, he also did in re-vaccination. He was strengthened in that by the experience of officials of the Homerton Small-pox Hospital, who all escaped the disease, and the same with our City Hospital Nurses here—all due to re-vaccination.

Dr. A. E. COPE (London) said that first of all he did not think they could expect any further legislation until the end of another five years. With regard to the question of the Local Government Board refusing to supply lymph to private practitioners, he knew that everything was being done to meet the demand, but only with the greatest difficulty could public Vaccinators be supplied, and it would be almost impossible for private practitioners to be supplied at the present time. He thought that it had been stated that the question was still under consideration, and that they would try to arrange for private practitioners if possible. With regard to the wording of the vaccination certificate, mentioned by Dr. Bond, he failed to see himself how it was possible to insist upon a legal standard of efficient vaccination. Supposing they had a child vaccinated, whether with four insertions or one, the child was protected for a certain, even though in the latter case it might only be a limited time. And that was why he thought there should be school inspection, in order to see whether there was imperfect vaccination, and if possible to remedy it by offering to vaccinate again. With regard to the question as to the details of aseptic vaccination, these details might be quite different in the hands of different medical men. They would not find two men opening an abscess in exactly the same manner, as regards the precautions adopted. One had to go upon general principles, the details to be worked out by every medical man for himself. He did not say he had reached finality, but he would tell them what he did at the present, and perhaps that would be the best answer to the question asked. First of all, he washed the arm with alcohol or boiled water; then he made the insertion of lymph, and put a pad of boric wool fastened by two strips of half-inch plaster across the outside of the arm, leaving it until he went a week after. This, he found, stayed in place without any difficulty, and on his second visit he generally replaced the pad by a new one in the same fashion. Sometimes he used a little boric acid dusting powder. These details showed the general principles on which he was acting at present, and he was finding it generally successful.

"*Notes on 'Guarantees' of the Purity of Milk Supply,*" *by* Bushell Anningson, M.D.Camb.

(Fellow.)

When I undertook at the invitation of the Referee and Editing Committee to offer for the consideration of this Congress a few remarks on "Guarantees" of the purity of milk supplies, I had not fully appreciated the difficulty of the undertaking. "Guarantee" in its lexicological sense means "an answer for due performance—an assurance"; also I assume that by the term "purity" is meant "freedom from any materials injurious to health or capable of causing disease." No doubt in the former case some guarantees may be possible, but in the latter more serious case the only real guarantee is "Pasteurisation" of the milk by the consumer himself. On the other hand, "safeguards" against impurity may be devised in regard to both. In view therefore of the above considerations, I propose to consider such measures of precaution as are of possible application. There is one disadvantage in too strong an insistance upon the practice of "Pasteurisation," inasmuch as it throws upon the consumer the duty of protecting himself, and thereby in a measure relieves the producer and purveyor of the moral obligation at any rate of safeguarding the purity of the milk supplied.

The less grave injurious qualities of milk—such as defect in its nutrient constituents, caused by their deliberate removal, or addition of foreign matters for the purpose of preservation or colouring—can be checked by ordinary analytical methods, but unless each quantity as it is distributed be submitted to antecedent examination (an impossible procedure) nothing in the sense of a guarantee can be given. The more grave contaminations of milk by the introduction of the materials of infective disease are, in a limited degree, already provided against, in regard to both human and animal infectious diseases, by several statutes and regulations.

The origin of these impurities is either from an external or an internal source. The internal source is a diseased state of the cow. The external sources are :—

1. The (*a*) hygienic state of the cowsheds;
   (*b*) condition of the milker;
   (*c*) state of the milk-receiving vessels.

(2) The distribution by (*a*) street deliverer;
   (*b*) shop assistants.

(3) Methods of storage before distribution.

The Infectious Disease (Prevention) Act, 1890, gives power

under section 4 to exhibit contaminated milk for sale; this provision is clear and unambiguous, but is in some sort a safeguard. Likewise by Article 9 of the Dairies, Cowsheds and Milkshops Order, 1885, it is enacted as follows:—"It shall not be lawful for any person following the trade of cow-keeper or dairyman, or purveyor of milk, or being the occupier of a milkshop, (a) to allow any person suffering from a dangerous infectious disease, or having recently been in contact with a person so suffering, to milk cows or to handle vessels used for containing milk for sale, or in any way to take part or assist in the conduct of the trade or business of the cow-keeper or dairyman, purveyor of milk, or occupier of a milk store or milkshop, so far as regards the production, distribution, or storage of milk; or (b) if himself so suffering or having recently been in contact as aforesaid, to milk cows, or handle vessels used for containing milk for sale, or in any way to take part in the conduct of his trade or business, so far as regards the production, distribution, or storage of milk until, in each case, all danger therefrom of the communication of infection to the milk, or of its contamination has ceased." And by Article 10, the danger of contamination by means of any drain is provided against, but in regard to the presence of infected persons, it will no doubt be held by legal [illegible] that a disease [illegible] is dangerous only since the [illegible]—Tuberculosis would not be [illegible] same Order." Regula- [illegible] milk which may be made by local [illegible] which may be exercised [illegible] Board is limited to direct the [illegible] of too restrictive a [illegible] hence it is that the [illegible] by the infective [illegible] under the Order—" the [illegible] proper precautions to [illegible] infection or contamination [illegible] other source." A [illegible] in regard to contamina- [illegible] Article 15 of the [illegible] meaning assigned to it by [illegible] cattle-plague, [illegible] foot-and-mouth disease." By the re- [illegible] Article 15 is amended so as to [illegible] the Order.

[illegible] model regulations are suggested [illegible] authorities very much more comprehensive

than were originally allowed by the Board, especially in regard to the protection of milk from human exhalations while stored in milk purveyors' shops for sale. In the revised regulations a milk purveyor is required to prevent the exposure of the milk to any infection or contamination; in particular he is not allowed to deposit or keep any milk intended for sale in any part of a private dwelling exposed to the chance of infection or contamination by any person suffering from an infectious disease, or from infection or contamination of exhalation or effluvium from various sources. Why these better and larger defined regulations could not have been allowed, even if not suggested long ago, is difficult of comprehension. The new Order in many of its particulars affords better safeguards against contamination than its predecessors, either by infectious disease generally or by tuberculosis, with which it is more especially concerned.

Guarantees and safeguards are, with the one exception of "Pasteurisation" of milk, more difficult of application to tubercular infection from man and animals than to other infectious diseases.

In his second Harben lecture, Sir R. Thorne Thorne points out that the administrative measure of control which would naturally commend itself to most minds as necessary to meet the evil is the exclusion of tuberculous cattle from dairies, but points out also difficulties and fallacies in such a measure; these appear to be (*a*) pathological, and (*b*) economic. With regard to the first he quotes Drs. Martin and Woodhead, who say in their evidence as Assistant Commissioners: "The withdrawal from dairies of every cow that had any disease whatever of her udder would form *some approach* to security against the serious danger incurred by man from the use of tuberculous milk, but it would not be an adequate security." Other extracts from the same lecture point to the inadequacy of efforts to arrest infection at its source: "The difficulty of detecting tuberculosis of the udder in its earlier stages constitutes one of the principal dangers to man as a consumer of cow's milk." The only method therefore left us is to eliminate from a milch herd every animal that reacts to the tuberculin test, and against this measure must be set the enormous economic difficulty. The total percentage of animals which would come under the operation of such a scheme has been calculated at 40 to 96 per cent., of which only twenty would probably be really infective. From this method there can therefore be nothing of the full value of a guarantee obtainable.

Then again in regard to the bacteriological examination of samples, two difficulties at once present themselves. First, the

ascertained fact that "failure to detect the Bacillus Tuberculosis in a single sample in no way implies that another sample taken at another time from the same cow will not contain them"; secondly, the length of time needful for the application and verification of the test.

None the less for the absence of effectual guarantees it does seem desirable that all possible safeguards should be adopted. The following suggestions may be made in regard to the animals:—

(1) Eradicate the disease from stock by "breeding it out" as recommended by Professor Bang, viz: by

(*a*) Testing all breeding stock with Tuberculin.
(*b*) Separating the diseased from the healthy.
(*c*) Placing the healthy in a clean, healthy, well ventilated and lighted shed.
(*d*) Placing the diseased in a disinfected, clean and well ventilated and lighted shed.
(*e*) Branding all re-acting animals on the horn or hoof so that they can readily identified, and continuously isolated.
(*f*) Keeping separate utensils for their use, and even separate attendants.
(*g*) Slaughtering *at once* all those that show signs of *advanced disease*.
(*h*) Fattening and slaughtering of, as soon as possible, all those that show disease of the udder or advanced tuberculosis, and on no account allow the milk to be consumed.
(*i*) Removal of all calves born of tuberculous cows away from their parents as soon as born, hindrance to their sucking their dams, and rearing them on healthy cow's milk or sterilized milk.
(*k*) Testing the calf as soon as possible, say at one or two months old, with tuberculin.
(*l*) Isolation and testing all fresh cows before allowing them to mix with the others.
(*m*) Re-testing the healthy stock twice during each year to be sure they are remaining healthy.

2. Protection of actual milk supply by:—

(*a*) Compulsory testing of all milch cows used for providing milk for sale; branding all re-acting cows.
(*b*) Experts to test the milk from re-acting cows both microscopically and by feeding guinea-pigs, and when found to be virulent condemn the cow for milking purposes and mark her with a special brand.

(*c*) Sterilization of milk obtained from re-acting animals before retailing it to the public, and heating the cream to 85 Fahr. before churning it into butter.

(*d*) Prohibition of the use of the milk of cows with diseased udders for food.

(*e*) Periodical examination of the cows and sheds by veterinary experts.

(*f*) Compulsory notification of any disease of the udders of milch cows and inspection of the same by veterinary inspector.

(*g*) Exclusion of persons in an infectious state (including phthisical persons) from all kinds of dairy employment.

Dr. HAROLD SCURFIELD (Sunderland) moved a resolution in sup-t of a scheme for the reduction of bovine tuberculosis. He ·ught that the method of Government procedure would be some-at similar to that sketched out by Dr. Anningson. In the Report the Royal Commission on Tuberculosis there was the following tement: "All precautions against the communication of tuber-ar disease to human beings by the consumption of the meat or lk of diseased animals must be regarded as temporary and uncer-n palliatives so long as no systematic attempt is made to prevent › prevalence of the disease among the animals themselves. We ısider that by far the most important part of the enquiry com-tted to us, as to what administrative procedures are available, and ›uld be desirable, for controlling the danger to man through the e as food of the meat and milk of tuberculous animals, lies in the rection of eliminating the disease." Most people, he thought, who d studied the subject would be fully in accord with that declaration the Royal Commission. It was often said that when a Royal ›mmission had reported the matter then dropped, and it was with e object of preventing this matter from dropping that the present ›olution was submitted to them. The only result so far from the liberations of the two Royal Commissions, which sat for eight or ıe years, was an Order prohibiting the sale of the milk of cows fering from tubercular disease of the udder. As there was no chinery for discovering this disease, the Order was practically ste paper. By means of the tuberculin test sound and tuberculous tle could be separated, and the sound animals protected from ›osure to infection. If this were done generally, tuberculosis ong cattle would soon be enormously lessened in amount, if not mped out altogether. There were many reasons why the breeder l farmer were not very likely to take up the use of tuberculin untarily. In the first place, in England, where public abattoirs re the exception, and the inspection was therefore very imperfect, arge amount of tuberculous meat was consumed, and the loss

[illegible] was not so great [illegible] the rule. In [illegible] cattle was able to sell [illegible] the man who had to bear [illegible] who was powerless to [illegible] So long as the farmer could [illegible] the butcher he was not likely to [illegible] Secondly, if a farmer [illegible] to go to the [illegible] tested, and pro- [illegible] reacters, and every [illegible] It would pay a few [illegible] they would get some [illegible] price for their milk, [illegible] institutions in their [illegible] sold. Although [illegible] interest in the [illegible] great mass of the [illegible] and there was [illegible] few farmers in each [illegible] why farmers did [illegible] was the difficulty in [illegible] to buy tubercle- [illegible] had them tested, and [illegible] animals were then [illegible] that if a tuber- [illegible] it would give a [illegible] test apparently [illegible] it was necessary [illegible] tuberculin test. He [illegible] progressive farmer who [illegible] palmed off on [illegible] simply failed to [illegible] time previously. [illegible] as a body would not [illegible] tuberculosis, either from fear [illegible] were desirous of doing so [illegible] Government stepped in [illegible] tuberculin test so as to protect [illegible] last Royal Commission [illegible] for animals condemned [illegible] were conditional on the [illegible] the amount of compensa- [illegible] would object to it. At [illegible] on swine fever, which [illegible] justifiable to spend so much [illegible] more justifiable to spend [illegible] getting rid of tuberculosis, [illegible] a great danger. He thought that [illegible] Associations, the Agricultural

Societies, and the various societies interested in Public Health, should be requested by the Council of the Sanitary Institute to endeavour to induce the Government to take action in this matter.

Dr. T. GLOVER LYON (London) seconded the resolutions, and said that he was present at the meeting when Dr. W. A. Bond read a paper on much the same subject, that of public abattoirs. A great number of butchers were present, and they pointed out, very justly he thought, the very great amount of injustice done them in the matter. In the first place, it was almost impossible to show there was any danger in the distribution of tuberculous meat. He was much struck by the argument that bovine tuberculosis was very rarely found in the flesh of animals. Tubercle was found in the parts outside the meat, such as the glands and sweetbread. The sweetbread of oxen was not much eaten, and if it was, it was very well-cooked, and, therefore, the bacilli entirely destroyed. In the case of an ordinary joint of meat the whole danger was in the outside, which was always well-cooked. He agreed with Dr. Scurfield in all that he said. The danger lay in the milk. There was no danger in the ordinary joints of beef, even when eaten underdone; and no danger in mutton or pork, because sheep and pigs did not suffer from tuberculosis. If they got rid of tuberculosis in animals it was probable that there would be no necessity for isolation of human subjects. The bacilli had great difficulty in establishing themselves in the human subject, and very probably could not do so unless reinforced by living in hosts more liable to the disease. Get rid of tubercle in animals, and it was not unlikely that the human subject would soon be free from the disease.

Mr. S. WOODWARD (Runcorn) said that Dr. Scurfield gave a challenge to Cheshire farmers. He happened to be a Cheshire farmer. Let him say that Cheshire farmers, the intelligent portion of them, were just as anxious to produce a supply of pure milk, free from all disease and impurities, as the scientists of the day. But, before they could accept the doctrine of the scientists with reference to tuberculosis and the supply of milk they must be satisfied that the tests in use were reliable and true. A short time ago, the Runcorn Rural Sanitary Authority had a report from the Medical Officers of Health for Liverpool stating that the milk from two dairies in the district was contaminated; the words used were, "Highly contaminated with tuberculosis matter." The beasts in one of these dairy stocks were tested by a properly qualified veterinary inspector, and he declared that every beast producing milk, or that had been producing milk, in that stock was free from tuberculous disease. It seemed possible, therefore, for apparently healthy cows to produce milk with tuberculous matter. Another experience in Cheshire. A gentleman went to public sales and purchased cattle, at a high price, to export to South America. They were declared, on being tested with tuberculin, to be infected. He had the cattle slaughtered and the carcases thoroughly examined, and found them to be without any sign of tuberculous disease. He made second purchases, and the

result was the same. With such cases as object lessons before them farmers thought they might be permitted to await the full development of scientific discovery before being asked to replace healthy stock by what might be diseased stock, such change involving largely increased expenditure.

Dr. E. Petronell Manby (Assistant Medical Officer of Health, Liverpool) said, that as an official of the town mentioned by the last speaker, he would like to say a few words. It was true that a sample of milk from a Cheshire farm, where all the cows had stood the tuberculin test, had been certified to be contaminated with tubercle. That was the report of the bacteriologist, and Dr. Manby had no reason to doubt it. But the last speaker omitted to state, or perhaps he was unaware, that between the time of the cows being tested, and the sample being taken, several months had elapsed (January to April), and further, that since the sample was taken, several cows had been sent away from the farm. Dr. Manby had discovered this fact when he visited the farm in company with the County Medical Officer, in consequence of the statement of the farmer, that all his cows had stood the tuberculin test. This was true, but the cows seen there were not all the same as the herd from whose milk the sample complained of had been taken. It was stated by the farmer that the cows sent away were, as far as he knew, in good health, but it must not be forgotten that it was some months since they had been tested with tuberculin, and they may quite well have developed some tuberculosis between the testing and the taking of the sample of milk. On the general question of tuberculosis in cows, even if the farmers were not yet convinced of the practical use of tuberculin in all cases, let them see at least that their cowsheds were put in order without delay. In Liverpool much attention had been given to the conditions of cowsheds, and he thought now they were very satisfactory. At the same time he knew from personal investigation that they were not good in the country. He knew of one farm, not far from where he resided, where there were two cowsheds, two cottages and a barn, all under one roof. He did not think that was good for the cows, and was perfectly certain that it was not good for the human beings. The line to take up now was to get the condition of the country cowsheds improved. Many of the farmers, with the best intention, did not seem to recognise the importance of absolute cleanliness, of light, and of ventilation. He would submit that the first thing to do in all cases was for the District Councils to make and efficiently carry out regulations, under the Dairies and Cowsheds Order. Many of them made no regulations at all; they said they were perfectly satisfied with the condition of things as they were, and did not want to make regulations. He knew from practical experience that things were not satisfactory.

Mr. W. Hunting (London) said he desired, as a veterinary surgeon, to give some support to Dr. Scurfield's resolutions, whilst referring to the paper. What struck him most, and what he cared most about, were the twenty-five or twenty-six suggestions at the

end of the doctor's paper, which were valuable and necessary, but made the subject look a little complicated. He was going to argue that the resolutions proposed by Dr. Scurfield would avoid nearly all the complexity of Dr. Anningson's clauses. As far as the purity of milk went in connection with the cow, there were only, bar accidental, two diseases which might be communicated to man, viz., diarrhœa and tuberculosis. Both of these had direct dependence on disease of the udder, and if tuberculosis in cows were scheduled under the Diseases of Animals Act, they could meet both these diseases and not conflict at all with the Medical Officer of Health—the Board of Agriculture would do its work, and the Local Government Board be left to its own sphere. The difficulty which had been pointed out by the Cheshire farmer as to the trustworthiness of the tuberculin test, was a matter in which he thought authority ought to have some weight. All leading veterinary surgeons were satisfied with the trustworthiness of tuberculin when properly carried out, when used as the painter's colours, "with brains." He thought instead of waiting until science mastered it, we might safely make use of what was now known by scientific men. Errors arose when men carried these tests out who did not understand them. The veterinary profession had had a large amount of experience, and had stamped out more than one disease somewhat like tuberculosis. The only practical difficulty was the matter of compensation. It could not be lost sight of. It did seem hard at the present time, whenever the milk-shops order was in force, that the dairymen should be fined directly or indirectly, by having to part with cows suffering from tuberculosis, and that the butcher, when a cow came into his possession, should lose the value of the cow if it was suffering from tuberculosis, whilst the man that sold to both, the farmer, could do as he liked. The farmer was the man who spread tuberculosis, and was able to test for it whenever he liked with tuberculin and discover what he had. The butcher and the cowkeeper could not do this unless at great cost. And yet the farmer, the very prime mover in all the evil, escaped without penalty. If the farmer endeavoured to clear his stock, how did he do it? He passed it on to his neighbour or to the butcher or cowkeeper, and the law allowed it. The whole of this would be controlled by scheduling under the Diseases of Animals Act.

Dr. G. Milson (Newington) proposed a resolution to the effect, That a Government Commission should be appointed to investigate the present outbreak of plague on the Continent, and that steps should be taken to provide a supply of Haffkine's prophylactic and other preventive serums. He thought the Government would be asked to assume greater interest in the Intelligence Department of the Public Health, and should send a Commission to take proper steps to be able to report upon the aspects of this particular thing. He was sure the resolution would commend itself to every member of the Section.

"*Ventilation for Crowded Buildings and Consumption Hospitals, with Special Reference to a New Method of Distribution and Removal of Air, and a Proposal for Legislation upon the Subject,*" *by* THOMAS GLOVER LYON, M.A., M.D.Cantab.

(MEMBER).

AT a moment when the necessity of ample supply of fresh air in the prevention and cure of disease holds a foremost place in the minds of everyone, no apology is needed for bringing the question of ventilation before an assembly devoted to the advancement of hygienic science and practice. An attempt to embrace the whole question of ventilation is not my intention; I shall limit my remarks to one department of this important subject, which is daily attracting more and more attention, and whose application is still in its infancy.

The problem I wish to lay before you is that of supplying air to rooms where there is such an aggregation of people as to render some method of forced ventilation necessary. Examples of such places are concert rooms, public theatres, churches, dining-rooms, saloons of ships and railway cars.

A glance at the problem involved in the ventilation of a theatre containing, say 1,000 people, is not out of place here. It is usually considered that each person at a theatre should be supplied with at least 1,000 feet an hour. At the Opera House at Vienna, the figure is 1,600. Taking this latter as a standard, for 1,000 people a supply of 1,600,000 cubic feet is required an hour, or about 450 cubic feet a second. As 12½ cubic feet of air weighs 1 lb., this corresponds to about 50 tons an hour, or 30 lbs. a second.

A consideration of these figures is sufficient to show that a very considerable force is required to move so large a body of air and distribute it.

In a case with which I am acquainted, where 600,000 cubic feet of filtered air an hour is forced through a room, a 4-horse power is used. On the same basis a theatre seating 1,000 people would require about 10-horse power. This estimate is, of course, extremely rough.

The necessity of mechanical ventilation in the case of crowded rooms, and the impotence of natural ventilation, was well proved by Dr. Barwise in the able paper read by him last year at the Congress of the Institute. He also showed how the extra expense entailed in supplying the extra purity of air was amply repaid by extra output in the case of workshops and extra grant in the case of schools. The gain by introducing good ventila-

tion into offices where clerks are crowded together would doubtless be even more marked.

Once having admitted the necessity of employing force in ventilation, the use of fans becomes imperative, such contrivances as heated exhaust flues are less efficient and extremely expensive to work.

I would here draw attention to a remark made by Dr. Scurfield, of Sunderland, in the discussion that followed Dr. Barwise's paper. "He thought there was a tendency when mechanical ventilation was adopted to try and cut down the inevitable expense and thereby wreck the whole system."

There can be no doubt that timidity in insisting upon a proper outlay, and a want of judgment in choosing adequate blowing power has largely depreciated mechanical ventilation in the estimation of the public. Just lately a prominent theatre architect told me he had introduced the plenum system into a theatre at a considerable extra cost, but had failed to find any improvement in the ventilation. This could only mean that the system introduced into the theatre was not of sufficient power for the purpose.

While agreeing with Dr. Barwise and most authorities on the superiority of the plenum over the vacuum system, I would insist on the great value of using both systems together, that is of blowing in air at inlets and exhausting it from outlets. Not only by this means is the air in rooms kept at nearly atmospheric pressure, but the necessity of making the building or rooms air-tight is dispensed with, and the consequent impression of stuffiness avoided.

It would be well to point out the fallacy of the idea that warmed air entering a crowded room is hotter than the air already in it. A moment's thought will show this is impossible. As long as air remains in a room it is heated by the breath and body heat of the occupants, and its temperature must rise above the temperature at which it was introduced. In other words the occupants of a room constitute a heating apparatus. The next question relating to the introduction of air into a room and its withdrawal is at what points the inlets and outlets should be placed. There is great diversity of opinion regarding this very difficult subject.

In considering this question the following points must be taken into account:—

I. *Inlet Impetus.*—Air entering a room in any direction has a tendency to pass on in the same direction by its own momentum.

II. *Outlet Impetus.*—Air flowing in a room tends to take the channels of least resistance, which are invariably towards

the free apertures, and especially such as are connected with exhausts.

III. *Internal Descent.*—Air introduced into a crowded room is heavier than that already there and tends to fall.

IV. *Internal Diffusion.*—Vitiated air tends to diffuse itself evenly throughout a building. This force, however, diminishes if the general air of the room becomes foul and acts very feebly in a badly ventilated room. Its importance also is less, the quicker the flow of air.

V. *Internal Ascent.*—Vitiated air has a tendency to rise. This factor lessens in importance with the thoroughness of the ventilation, for it is counteracted by the increased activity of diffusion, and like the latter, when a very rapid passage of air is necessary, this force will have only a very moderate action.

The problem before us of ventilating a crowded room is much simplified if we remember that to solve it we must carry pure air *en masse* into near proximity to all persons in the room; diffusion can only be relied upon to distribute the pure air through a small space. This convection of air must be effected by means of "Inlet impulse" and "Outlet impulse." "Internal fall" and "Internal rise" will play only subsidiary parts. They will usually be found to be disturbing influences rather than aids in the matter. No specific rules can be formulated to guide us in the employment of these forces; every case must be met after a study of the special circumstances attending it.

There are three main principles of ventilation, each having its advocates :—

I.—Some regard ventilation as a mere dilution of foul air. Most of the more modern systems of ventilation, such as those introduced by Mr. William Key and Messrs. Sturtevante & Co., adopt this principle. Pure air is thrown into the room upwards from about the middle of the wall, and this, by its momentum, runs on and strikes the ceiling and opposite wall, and gets pretty well distributed over the room. The air finds an outlet at an opening near the floor in the wall containing the inlet. If now there is a fast current of air through the room the air at the top and bottom is of nearly equal purity, and the system works well; but if the current is slow the air near the floor is the best in the room, and there is a considerable waste in removing it. This I have verified in a London Board School, where the outlet near the floor, at first open, was closed, and that near the ceiling (intended to carry away gas fumes), at first closed, was opened. A distinct improvement in the air was noticeable.

II.—According to a second principle, air should be let in at the ceiling and withdrawn at such a velocity from the floor that the exhaled air is drawn out before it has time to vitiate that in the room. This has been adopted in the French Chambers of Deputies, but it has been found that a sufficiently quick withdrawal of air to counterbalance the natural tendency of exhaled air to rise causes intolerable draughts, and the system is never employed in its full efficiency; it is indeed a lamentable failure, and is no doubt a potent factor in producing the frequent "scenes" for which this Chamber has an unenviable reputation.

III. The third principle is a compromise between the first two. It is maintained that fresh-air should be conveyed as directly as possible to each occupant of the room, and that the outlets should be at the places where the air is foulest, that is in general at the highest parts of the room.

I wish now to bring before you some points in favour of this last method, and to call your attention to a new apparatus for applying it.

First of all, it will be noticed that this principle takes advantage of the natural tendency of exhaled air to rise. Secondly, it necessitates a large area of inlets.

This brings us to another point of the greatest importance in the matter of rapid ventilation—the reduction of draughts. I would here draw attention to a point recognised by all practical ventilating engineers, and that is the impossibility of ventilating a crowded room satisfactorily unless the air is warmed before admission. Warming and ventilation are twin stars and cannot be separated. The introduction of cold air in sufficient quantities to ventilate a crowded room necessarily entails intolerable draughts. Again, it is not generally recognised to what degree enlarging the area of inlet reduces the velocity of air flowing into a chamber. For instance, if we admitted air from half of one wall evenly, and take it out at the other, the speed of entry and exit, necessary to change the air in the room would be half what it would be if only a quarter of the walls were used as openings. It is well known that if air is sufficiently heated there is scarcely a limit to the velocity of air that can be borne with comfort. But it is undesirable to heat air above a certain temperature. In England the standard temperature of a sick room is 60° F., and in America 70° F., rather less than the latter temperature will be found to be the most comfortable for places of amusement. Different people vary much in the susceptibility to draughts, but with such a temperature a current of air can by most persons be comfortably borne up to a velocity of about two feet a second. If, now, we have air at this velocity heated to about 65° Fahr. entering

evenly through inlets occupying a quarter of one side of a wall, the general current of air through the room will be a quarter this velocity; that is, at the rate of half-a-foot a second. This would admit every minute a volume of air equal to the whole capacity of a room thirty feet wide, yet at no part would there be a velocity of more than two feet a second. For ordinary purposes a twelfth of this speed would be ample and the velocity would not at any point exceed two inches a second, an almost imperceptible movement.

Having entered minutely into the question of inlets, it is unnecessary to dwell upon the nearly equally important one of outlets; they should be arranged upon similar principles, they must be large in area and well distributed about the room, in order to prevent the air flowing directly from the inlets to the outlets without affecting the general air of the room, and when the exits are placed near persons in the room in order to diminish the draught consequent on a rapid outflow of air.

I will now describe a new method of introducing fresh air into a room and conveying it directly to the occupants, and of removing the most vitiated part :—

This method is the invention of Mr. James Cadett, of Ashtead, and myself, and has been shown in actual work to several experts in a large drying-room.

First, as regards the distribution of pure air in a room: a conduit is placed just above or below the floor near the wall, and a tapering longitudinal slot is made in the top of this conduit and baffle plates are placed across the slot. If now air is forced into the end of the conduit at which the slot is widest it will, if the tapering of the slot be properly adjusted, flow out of the slot in an even stream up the wall. The reason of this is that as we check the motion of air, its momentum is changed into pressure. But the air rushing along the conduit is most checked at the closed end, and least at the inlet end, hence the pressure is greatest where the slot is narrowest and there is an even issue of air throughout the length of the slot.

If we place a screen of some perforated material, such as a wire gauze, having its meshes closest at the part furthest from the conduit, and reaching from ceiling to floor near the wall, the sheet of air running between it and the wall will be broken up into a volume of air issuing evenly from the screen.

It will be seen that a stream of air running through a narrow conduit has been changed into a volume of air flowing into a room at a greatly reduced velocity. This reduction can easily be made a hundred-fold. As it were a hurricane in the conduit can be reduced to an imperceptible breeze as it passes into the room. The conduit and screen can be put in any part

of the room, and in practice it will often be convenient to dispense with the screen. In a church for instance, it would often be enough to run conduits with triangular slots along the passages between the seats. The air thus introduced may be warmed, filtered or treated in any desired way. On the outlet side a similar conduit is used, except as the air is freest to enter the conduit near the outlet the slot is made narrowest here. Also in this case baffle plates are unnecessary. If we wish to abstract the air from the room through a screen of perforated material, this screen must be made of closer mesh near the conduit and wider at parts at a distance from it. Provision, of course, must be made for cleansing the air passages.

A simple instance of the application of this method was illustrated by the model shown at this Congress. Perforated panels are arranged at opposite sides of the room. Air warmed and otherwise treated is forced out of the panels at one side and withdrawn from them at the other. These panels are placed at a level corresponding to about the middle, three-quarters of the wall having a dado below them and a frieze above.

The "inlet and outlet impetus" will tend to pass the air across the room. The "internal fall" will throw the pure air gently down upon the occupants, and the exhaled air will pass upwards by "internal rise," and also diffuse itself throughout the room. By this means all the occupants will have conveyed to them directly nearly pure warm air.

Every construction of building will require special adaptation of apparatus, and much ingenuity will be necessary to meet the requirements of each particular case, but the control over inlet and outlet possessed by the method just described should enable a skilful operator to solve the most difficult ventilating problems if only he is willing to devote sufficient care to the task.

No question of hygiene has lately attracted more attention than that of erecting sanatoria for consumptives in England. The subject is a large one, and particularly suitable for discussion in an assembly like this, and I will only touch on one point connected with it. It seems clearly proved that very good results can be obtained by so treating consumptives in England. The pursuit, however, of the open-air treatment in our climate necessitates exposure to great discomfort. At times our weather leaves nothing to be desired, but often spells of cold, raw, foggy weather are experienced in the British Isles which entail, besides discomfort, very depressing effects upon those seeking recovery in the open air.

It seems to me that this can be avoided by adopting such a method of ventilation as I have sketched out. In every sana-

torium a large hall might be provided, plentifully supplied with filtered air, free from fog, and warmed to the temperature desired. Patients, in the event of inclement weather, might sit about or exercise themselves in this hall, in which also they might at all times take their meals in comfort, instead of at certain seasons of the year, embarrassed with thick garments and exposed to a cold, raw atmosphere.

The last point I wish to touch upon is that of legislative action. At the present moment owners of theatres, concert rooms, restaurants, &c., are granted licenses without any stipulation being made for a proper supply of fresh air. Yet most places of public resort are notoriously in such a condition as regards ventilation that they are active agents in the production of disease, especially of chest affections, including consumption. Keenness of competition appears to paralyse all private efforts to remedy the present state of things, and I believe nothing but the interference of the legislature or the action of local bodies will meet the exigencies of the case. The long sufferance and I must add the indifference of the British public as regards its own interest are serious bars to all attempts to move in the matter, but it seems to me this Institute is eminently fitted to take the first step. I would therefore suggest that before a license is granted for any building of public resort, it should be definitely ascertained that provision is made to admit a standard quantity of fresh air to each person which the building is intended to accommodate.

Mr. F. W. HART (Hackney, London) said that about a year ago some alterations and additions were made to the Town Hall. Previously, the Hall was lit by three large "sun-light" burners, with large ventilating tubes above 20 inches in diameter to carry off the products of combustion. During the time the gas was used, on the occasions of divisions when the members came into the Hall again they found no inconvenience from bad ventilation. When the alteration took place and the electric light was installed, then, after being in the fresh air of the lobbies and returning to the Hall the air was found to be most offensive. He suggested that where the electric light was introduced—knowing that the heat was much less than that from gas-light—strong efforts should be made to increase the supply of air, and thus maintain the purity of air in buildings lit by electric light. He ventured to think that the system they had just had explained to them merited their earnest consideration.

Dr. R. SYDNEY MARSDEN (Birkenhead) said that the scheme of ventilation proposed by Dr. Lyon was absolutely impracticable. It was a very pretty thing in model and description, but it was a thing that no architect would take up. The fact was that in a very short time the wire gauze would be saturated with germs and dirt. It could not be kept clean for long together. And, if Dr. Lyon had been a medical officer of health for a few years he would have known that no architect or builder would entertain such a proposal for ventilation.

Mr. T. B. PEASE FORD (Bentham) said he was a spinner in the West Riding, and he wished to ask how Dr. Lyon provided for the proper humidification of the air? He understood that his system was for large rooms and institutions, and, therefore, he thought it might be safely said, he reckoned it suitable for factories. According to the Factory Acts, and other requirements, they were compelled to supply a very considerable amount of air for each hand occupied in a room, and they had to keep a certain temperature; and for trade purposes, a certain degree of humidity was necessary. That was one of the great difficulties. He came especially to hear the paper, knowing the inability of any man he had yet consulted to supply the requirements of the Factory Acts. If the scheme of placing wire gauze round mill walls was introduced, they would find the materials which were being manufactured would be greatly damaged, if not absolutely destroyed in many cases, by the air coming too rapidly into contact with it. If that was the case in the factory, would not the human frame, which was more delicate than machines, suffer in the same way?

"*Public Slaughter-houses for Urban and Rural Districts,*" *by* R. SYDNEY MARSDEN, M.B., D.Sc., F.R.S.Edin., Medical Officer of Health for Birkenhead.

I DO not propose to read an elaborate and exhaustive paper on this subject, but rather to summarize my remarks and condense them into as few words as possible, making them more into a text for others to express their views upon, rather than to again repeat what I have so often said at previous congresses.

URBAN DISTRICTS.

I take it that the desirability of substituting public slaughter-houses in place of private ones in our urban districts is now

universally admitted by all, who are in any way conversant with the subject, and I therefore do not require to go into the *pros* and *cons* of this part of the subject. But with regard to their provision in

RURAL DISTRICTS

there may be differences of opinion. Personally, I consider that public slaughter-houses in rural districts ought to be provided. You can never get proper control or efficient inspection of your meat supply without them. What is the existing state of things? In the great majority of country districts, the inspector of meat is the general inspector of nuisances, whose time is fully taken up with the ordinary sanitary work, and as a general rule he knows absolutely nothing about the diseases of meat.

The Medical Officer of Health is very often a half-timer, whose knowledge of meat really consists of his pathological training as a medical man, and who generally has not any special knowledge in meat inspection. He is only called in when the inspector drops upon a flagrant case or has made a mistake, and does not know quite where he stands; the outcome very often is loss of prestige to the reputation of both, and the result is that there is not very zealous attention paid to this particular portion of the official duties, and in large portions of the country there is practically no inspection whatever. The result of this is that the little slaughter-houses dotted about all over the country in different villages, are in many cases excellent centres for bad and affected meat (after being tampered with, stripped, and dealt with in every possible way so as to hide the disease) to be sent into the markets and into the towns by every way and bye-way, and the final result of it is that, in spite of the strictest inspection in the town abattoirs, a great many towns are suffering from this poisoned traffic coming in from the country, where there is no inspection whatever.

I do not see how, if you do not grapple with that particular branch of the question, any amount of true inspection in the towns is going to give you more than a limited protection, and I think the matter is one which calls for immediate attention.

I have long thought that if district centres were formed (pretty much on the same lines as combined districts for fever hospital purposes) where the slaughtering must take place, and you had a properly qualified man as district meat inspector to supervise that particular section, you would practicaly get the immunity which a town now possesses.

I would make central abattoirs in the centre of the various

districts, and abolish private slaughter-houses entirely throughout the country.

Nearly all country districts are arranged around some particular centre which is the focus of the whole place. Take postal districts, for instance, they all centre in the most convenient village of the districts they serve; and it is there that I would put the public abattoir for the district.

Of course this would necessitate the butchers coming from the adjacent villages to kill and fetch back their meat, which in some instances, would mean travelling two, three or even as much as five or six miles, but the same distance would have to be travelled in many of our large towns, such as Liverpool, Manchester and Birmingham from the outlying districts to the public abattoirs, especially if the abattoirs were placed at one end of the Borough.

Distance, however, does not count for much in the country once a man has started in his cart, if he could carry the meat two or three miles, he could without much more difficulty carry it five or even six.

Every man who has been a Country Medical Practitioner knows this quite well, he knows that there is a certain radius around his particular centre which can be conveniently served and worked, and that the distance of a mile, more or less, is not accounted very much of a difficulty when once he has got started.

The Country Doctor knows pretty well which is the most convenient centre for working a district, and you will generally find that it corresponds pretty closely with the postal centre.

I see no great difficulty therefore in making such a centre the one for a public slaughter house.

But I shall be told that such a measure would imply an enormous number of abattoirs throughout the country. Yes, but there is an enormous number of private slaughter houses throughout the country, which are all to my mind centres which cannot be and are not inspected, and, generally, are not conducted on very sanitary grounds in any way.

A great deal of questionable and diseased meat is killed in some of these places, and is sent into the market and into the towns, and in this way frustrates, to a large extent, the objects of meat inspection in the urban districts. You cannot get proper inspection of meat until you have got rural, as well as urban, public abattoirs under the supervision of specially qualified meat inspectors, well acquainted with the trade.

Such inspectors ought, in my opinion, to be appointed by the County Councils, and work under the direction of the County Medical Officers of Health. This would relieve them

and the District Medical Officers of Health from the local influences which must necessarily bear upon them, if such offices were held under District Councils; and it is most desirable that officials having to perform unpleasant duties of this kind, should be removed as far as possible from such local influences.

I am therefore strongly of the opinion that rural public abattoirs are practicable and desirable, and that it is only by the institution of such places in both urban and rural districts, that any really efficient inspection of the meat supply of the country can be obtained.

Mr. T. B. Pease Ford (Bentham) said he should like to point out that the nearer the animals were to the slaughter-house, and the more gently they were taken to such, the more suitable for human food would their flesh be. At present they were taken in railway trucks a considerable distance, and submitted to exceeding hardships, and, as he understood it, for he was not a medical man, the meat suffered materially from transit, and he was informed nearly ten per cent. in value of the animal was lost in its transit from country to town. Also, after slaughtering, the offal or garbage had to come back to the country places as manure. If these slaughter-houses were placed in centres of country districts, and the animals were led gently to them, and the offal or garbage was at the disposal of the farmers, he believed the meat would be taken in a healthier condition to the town, and not only the consumer would benefit, but the producer also. This matter was claiming attention in the agricultural districts, more perhaps than they were aware. He came from a country district, and there were large numbers of farmers in the neighbourhood. Several of them had been to him and asked him, as their representative of the West Riding County Council, to see if anything could be done in the very same direction as the scheme of Dr. Marsden. They had no power, and he was only too glad to thank the author of the paper if only some good could result, not only to the consumer but to the producer also.

Dr. J. Wright Mason (Hull) concurred in the suggestion of Mr. Ford that there should be a more efficient inspection of meat in their rural districts. In the rural districts of Yorkshire and in Lincolnshire, the inspection was sometimes deputed to Inspectors of Police. Meat of a suspicious character was often sent in pieces into large towns surreptitiously, and it was therefore sometimes difficult to recognise, when mixed with other meat, except after careful examination. He stated that persons sending meat unfit for food into towns, in

such a manner, should be indicted at Quarter Sessions without the option of a fine. He advocated the establishing of slaughter-houses in rural districts, as well as in towns. In large centres of population the offal could not be removed from common slaughter-houses without creating a nuisance, and the slaughtering of animals in the country in well arranged abattoirs, with efficient inspection, would minimise the danger to traffic, and the nuisance arising from animals being conveyed through the streets of our crowded thoroughfares.

Dr. E. PETRONELL MANBY (Liverpool) said he agreed with everything Dr. Marsden said. The whole thing lay in the education of public opinion, which did not yet sufficiently appreciate the importance of thorough meat inspection, and the need for municipal slaughter-houses. Let them do all they could to educate that opinion, and when it was formed on the subject, they would get their public slaughter-houses. But he was afraid the building of public abattoirs without compulsory closure of private ones would not be sufficient. He thought Dr. Marsden's suggestion of several authorities combining to build slaughter-houses an excellent one.

Alderman SUGDEN (Brighouse) remarked that the last speaker said the country wanted educating. He thought that the Sanitary Institute was the proper body to educate it. And he thought recommendations should go from that meeting to the Government, that all private slaughter-houses should be done away with, and that some such system as suggested by Dr. Marsden should be adopted. It was a very important subject, and had been very clearly set before the meeting that morning; and he should like to suggest that some recommendation should be made to the meeting to get the Government to take it in hand. He thought they would educate the country very much sooner by Government taking the subject in hand, and declaring that all private slaughter-houses should be done away with.

Alderman FRASER (Hull) said they were deeply interested in the question at Hull, where, as Dr. Marsden told them, they had eighty-six private slaughter-houses. These, as was well known, were not always in the best lights or the best parts of the city. Slaughter-houses they had in Hull so dark, so dreary, that it was impossible for any inspector or medical officer to make sufficient inspection. In the meantime their city corporation had appointed a deputation to visit Glasgow, Edinburgh, Deptford, Manchester, Liverpool, Birkenhead, and various other places; and their object was to obtain all the information they could in reference to the establishment of abattoirs. They found this one fact in reference to Birmingham, that in Birmingham they had established one of the best, most recent and satisfactory slaughter-houses in the Kingdom, and they had made no compensation. They compensated nobody, but the experience of Birmingham was this: that having shut up some private slaughter-houses, the effect of public opinion as to the benefit gained

by public abattoirs, so impressed the butchers themselves, that they were quietly shutting up their own places and coming to the public slaughter-house. The public felt they had greater certainty and security. He was sure he joined most cordially with the gentleman who had spoken on this existing state of things, and the absolute necessity for action. It was no good going on talking about tuberculosis and anthrax, or any other disease, if they did not do something.

Dr. R. SYDNEY MARSDEN (Birkenhead) said he had not intended replying on the discussion, but, in reply to the query as to the eventual destination of offal, he might say a few words. Birkenhead, as they were aware, was the largest meat centre in the country. They dealt approximately with a quarter of a million carcases per annum, and the question of garbage was a serious matter. He thought there was a misunderstanding on the part of one or two of the speakers when they spoke of offal as garbage. The offal, (*i.e.*, livers, lungs, tongues, hearts, spleens, &c.), was taken to market and eaten, along with other of the internal organs. But garbage, (*i.e.*, manure and waste refuse) was a distinctly difficult thing to get rid of. It was taken away in covered carts for manurial purposes, and almost necessarily made a nuisance as it went, and they could not stop it. Therefore the suggestion of Mr. T. P. Ford was a very valuable one. He was much pleased to find the unanimity with which his proposals had been received.

THE PRESIDENT OF THE SECTION (Sir Joseph Ewart) stated that it was not the custom to take into consideration any resolution on the spur of the moment, or before it had been considered for some time by notice given. Therefore he was sorry to say he must rule it out of order. It had further come to his knowledge that the question of private slaughter-houses had received and was receiving the attention of the Council. He hoped that they would not be long in dealing with it.

"*The Control and Inspection of Imported Meat*," *by* FRANCIS VACHER, F.R.C.S., Medical Officer of Health for Cheshire.

(FELLOW).

AMONG the subjects which the Council of the Sanitary Institute thought it desirable should be discussed at this Congress is that of Control and Inspection of Imported Meat, and it has been suggested to me that I should give my views thereon.

At present the animal food supply of this great kingdom comes to the consumer without any sufficient guarantee as to

its soundness or freedom from disease. The efficient control of the meat markets of the country, for sanitary purposes, thus represents a problem yet unsolved. It naturally divides into two parts, viz.: (1) The inspection of home-grown meat, and (2) The inspection of imported meat. The first of these topics I have often taken occasion to discuss, the second is my subject to-day.

Imported meat reaches our shores in various ways:—

1. As cattle, &c., discharged at a foreign animals' wharf.
2. As cattle, &c., discharged at a free landing.
3. As carcases, &c., mainly frozen or chilled.
4. As meat hermetically sealed in tins or otherwise preserved.

For the efficient sanitary control of the meat coming into the kingdom proper arrangements must be made for the inspection of animals imported for food, no less than for carcases and tinned meat, or meat otherwise preserved. The subject to be dealt with may therefore be conveniently considered under four headings.

1. *Inspection at a Foreign Animals Wharf.*—The extreme infectiveness of some epizootic diseases, and the possibility of such diseases being communicated to the consumer of infected meat, warrant certain provisions in the Contagious Diseases (Animals) Act, 1878, under which parts of certain ports have been constituted Foreign Animals Wharves. At such wharves only can animals be landed which are from countries scheduled as infected; and as these animals are required to be slaughtered where they are landed within a specified time, at these wharves have been erected such buildings as seemed to be necessary for the sheltering, inspection, and slaughtering of such animals, and for the storing of carcases of meat. From the floating landing-stage or quay the animals are conducted by guiding barriers to the lairages, were ordinarily they remain for a few days. Beyond the lairages, across the yard, are the abattoirs, and beyond these are the cooling-rooms and chill-rooms. From the cooling-rooms and chill-rooms the carcases are sent by rail or otherwise to all parts of the country. What arrangements are made in a large establishment of this kind to insure that meat "diseased, or unsound, or unwholesome, or unfit for the food of man," is not sent out? Inspectors (so-called Privy Council Inspectors), who must be duly qualified veterinary surgeons, are appointed, whose duty it is to examine every animal landed, while alive, in order to see that it is not suffering from any infectious disease, *i.e.*, pleuro-pneumonia, anthrax, foot and mouth disease, sheep scab, tuberculosis, &c. If the veterinary surgeon's examination leads him to suspect say pleuro-pneumonia, he has the animal slaughtered, and if

the lungs be diseased, this is reported to the central authority, and the diseased lungs (or a portion thereof) are sent to London for examination by an expert. Thus every animal is examined, and (except as it not unfrequently happens that the veterinary surgeons are pressed to accomplish more work than seems reasonable), properly examined. However, the examination of live animals cannot be sufficient, yet this is all which is arranged for, and all which takes place, unless the District Medical Officer of Health and his inspector are sufficiently interested to undertake meat inspection at the Foreign Animals Wharf in addition to their manifold duties. Now, I am not of opinion that a large amount of diseased or unwholesome or unsound meat reaches this country by way of the Foreign Animals Wharf. On the contrary, I believe that the amount is infinitesimal; but this is due rather to good luck, than to any control exercised or inspection provided. So healthy are the animals imported even from countries scheduled as infected, and so well equipped are the vessels used for carrying them, that I am informed importers do not ordinarily insure the animals.

However, arrangements made solely with the view of protecting the stock of this country from being contaminated with imported infectious disease, cannot be sufficient. Under such arrangements, an animal having actinomycosis would not be stopped, and tuberculous animals may often be passed. When one considers the provision made for the inspection of meat in most continental towns, one is surprised so little is attempted at the large abattoirs in connection with our Foreign Animals Wharf. Compare the staff and equipment for the inspection of meat at the abattoir of La Villette in Paris, or at the abattoir at Curegham, in Brussels. Every animal should be subject to inspection while it is being dressed or shortly after it is dressed, and the viscera should as soon as removed be displayed close to the carcase till the carcase has been inspected. Different arrangements from any existing at present at abattoirs of a Foreign Animals Wharf would have to be made, and the Chief Inspector should be provided with a post-mortem room and a laboratory, fitted up with microscopes and bacteriological apparatus. The Inspector as he goes his round should stamp each side of a carcase which he passes with his official stamp, at a spot agreed upon. The design on the stamp should be in sharp outline, which could be rendered distinct by a drop of aniline dye. Carcases or viscera not passed should be removed to a locked store till they can be dealt with or destroyed. Thus every carcase or side of meat, wherever sent by the wholesale trade, would carry a mark indicating two

things—that it came from a Foreign Animals Wharf, and that it has been passed as sound. There is, indeed, no reason why the stamp should not also indicate the date of killing.

2.—*Inspection at a Free Landing.*—I have said that the inspection provided at a Foreign Animals Wharf is for the purpose of keeping the Board of Agriculture informed of the cases of infectious disease imported, &c. However, unless animals are from countries scheduled as infected, they may be landed practically anywhere. Such animals are under no obligation to be slaughtered within fourteen days, and may be used to augment the herds and dairy stock of the country. They are of course subject to the ordinary restrictions regulating the movement of animals. Yet there is nothing to prevent an animal thus imported, as there is nothing to prevent a home-bred animal, being sold to a butcher and slaughtered and dressed in a private slaughter-house, and sold as human food, without any inspection of the carcase taking place, formal or informal. Such an animal may have tuberculous lesions present on the pleura and peritoneum and in the lymphatic glands; still the meat may look good and well nourished, so that there is nothing in it to warn the consumer that he has purchased food specifically infected with tuberculosis. What then is required? There is obviously no call for a system of inspection for live stock all round the coast; the imported animal being less likely to be diseased than the home-bred animal. What is needed is the general provision of public abattoirs, and the gradual closing of all private slaughter-houses. This I have often advocated. Its achievement will prove no easy matter, but nothing less will suit the requirements of the case. The little private slaughter-houses, such as now exist up and down the country, seem to me bad beyond all possibility of amendment. Numbers of them are dilapidated wooden sheds, and a very large proportion were not originally constructed as slaughter-houses, and are not used exclusively for slaughtering. Private slaughter-houses do not afford butchers ordinary facilities for cleanly slaughtering, and efficient inspection of them and the meat prepared in them is impracticable.

It may be said that public abattoirs, though useful and necessary in large towns, are inapplicable to small towns and rural districts. Those who hold this view have probably formed some exaggerated idea of what is meant by a public abattoir. It may be but a small place, when the requirements of the district are small. The requisites are accommodation for lairing, slaughtering and dressing, and cooling, and these may be provided in a single building having three compartments. I may mention a few essentials: 1. The building must be quite

separate from other buildings, and the walls and floors must be impermeable. 2. The whole must be well ventilated, drained, and supplied with pure water; must not admit the direct rays of the sun, but be well lighted, allowing slaughtering always to be done with closed doors. 3. Each compartment must be wholly separate, and be used only for the purpose designed.

Many advantages would result from the abolition of private slaughter-houses, and replacing them with properly-constructed public ones; *e.g.*, the removal of many old-standing nuisances, the checking of cruelty, and the objectionable practices of blowing and stuffing, &c. But the main advantage is that by this means only is efficient inspection of meat practicable. Once get rid of private slaughter-houses, and inspection can be arranged for as a simple matter of routine.

3. *Inspection of Carcases mainly Frozen or Chilled.*—No doubt carcases imported without treatment, or frozen or chilled, are ordinarily subjected to some inspection at the port where they are discharged, or when they reach their destination. However, judging of these carcases by their appearance merely, without any reference to the condition of the viscera belonging thereto, should not satisfy the public. No one will contend that this meat when landed, or when received, is subjected to even an approximately thorough examination. It is examined (as home-bred and killed meat is examined) by officially dubbed inspectors, who may have undergone no training as such, and whose vocations, previous to receiving their appointments as meat inspectors (quoting from a recent Parliamentary Return, dated 27th August, 1895) were as follows: plumber, carpenter, cheesemonger, ticket inspector, builder, plasterer, provision merchant, florist, stonemason, compositor, surveyor, gasfitter, bricklayer, &c. For the reason already given the inspection of imported dead meat should be very thorough, and by men trained for the work who have proved their knowledge and skill by passing an examination. To secure uniformity of inspection as well as efficiency, it seems to me the inspectors should be appointed by a central authority, who would supervise and control their work, to whom they would report and appeals could be made. The scandal of meat being passed in one place which would be condemned in another would thus be avoided. But, it may be said, can frozen or chilled meat be efficiently inspected? Given capable inspectors and reasonable facilities, I believe it can, though the examination of such meat can never be as certain and satisfactory as the inspection of a freshly killed and dressed animal, with the viscera in close proximity. The frozen meat, for

instance, might be from a tuberculous cow, and nothing in the meat to indicate it. However, imported dead meat is mostly from cattle fed in the open air, and not as liable to tuberculosis as cows which have been kept in town-byres and used for dairy purposes.

The question has been asked with reference to imported frozen and chilled meat, and all meat imported dead: How should it be marked? If the object of the marking is merely to show that the carcase or side has been duly inspected and passed, then it may be done with a small official stamp at a spot agreed upon, as I have suggested in the case of carcases examined at the abattoir of a Foreign Animals Wharf. If, however, the object be to indicate to consumers that the meat has been imported dead and preserved by freezing or chilling, then one small stamp on each side is not sufficient. On the contrary, each side of mutton would have to be marked in five places, viz.: at the shoulder, neck, breast, loin, and leg; and each side of beef would have to be marked in twelve places, viz.: at the neck folds, back ribs, top ribs, brisket, fore leg, fore ribs, sirloin, thin flank, thick flank, rump, buttock, and hind leg. Marking a carcase all over like this would take some time, nor is the colour-stamp suited for the purpose: it would have to be done by lead seals attached by cords, or in some similar way.

I am aware that occasionally carcases are labelled as having been examined. If meat inspection were dealt with as an international question, it would of course be better that the carcase should be inspected where dressed, along with the viscera belonging to it, say at the port of shipment, than at the port where it is discharged. However, some inspection should always take place on arrival, for meat certified as free from disease may yet be unsound owing to the refrigerating apparatus having failed to act efficiently.

4. *Inspection of meat hermetically sealed in tins or otherwise preserved.*—The difficulties in the way of inspecting frozen sheep and sides of beef, most of which arrives sewn up in canvas or calico, are trifling compared with the difficulty of inspecting meat enclosed in tinned-iron cans. A carcase with which there are no viscera "is pretty well a conundrum," says Dr. Chalmers. What then is a closed tin of meat? A riddle past finding out. All that can be done here as regards meat sealed up hermetically, is to make a rough and ready examination of tins and reject the bulged ones. I think also that the firms who do the canning should be required to stamp their name and address and the date of sealing on each tin, instead of merely labelling them.

The only possible way of subjecting tinned meat to efficient

inspection, would be to have inspectors at the factories on the other side appointed from this side. The factories are ordinarily in connection with abattoirs contiguous to ports of shipment. Indeed, the inspection to be efficient must be where the killing is done.

As regards dried, salted or smoked meat, it would doubtless be possible to arrange for the inspection of this at the port of arrival; however, if this country had its own inspectors at the port of debarkation the inspection of salted and smoked goods might be intrusted to them as well as the inspection of goods in course of preparation for tinning.

I have nothing further to say on this very important subject, though I am conscious that I have but touched the surface of it.

The points I especially wish to insist on are:—

1. That the public, who have no proper guarantee as to the inspection (good, bad or indifferent) of home-bred and killed meat, cannot count on any inspection of imported foreign meat.

2. That such inspection of imported meat as takes place is often *ultra vires*, fortuitous and necessarily superficial.

3. That inspection of carcases, without the viscera belonging thereto is of comparatively very little value.

4. That what constitutes efficient inspection should be authoritatively declared, and that the standard regulating the passing or condemning of meat intended for food of man should be a uniform standard.

5. That as far as is practicable foreign meat should be inspected, under some central control, by trained inspectors at the port of debarkation and the port of arrival.

"*Parliamentary Powers for the Sanitary Supervision and Control of Ice-Cream Manufacture,*" *by* E. PETRONELL MANBY, M.D., D.P.H., Assistant Medical Officer of Health, Liverpool; Lecturer in Public Health, University College, Liverpool.

(MEMBER.)

THAT the manufacture and storage of ice cream is, as a rule, carried out under very insanitary conditions, is no new fact.

The question of interest to Medical Officers of Health is how these conditions, so prejudicial to health, can be improved. The subject has been discussed on more than one occasion at one society or another, and resolutions condemning the present state of affairs, and urging the granting of controlling powers to Health Authorities, have been passed. As far as I am aware, however, Liverpool is at present the only Local Authority in England which has obtained such Parliamentary powers. Perhaps therefore it may be of some interest to you to hear what those powers are, and our experience of the first year's working under them.

Several outbreaks of typhoid fever, apparently due to contaminated ice-cream, have been reported of late years.

A full account af such an outbreak appeared in Dr. Hope's Annual Report on the Health of Liverpool for 1897, and I will only very briefly mention the points here.

All the patients were children of school age, and all attended the same school.

Possible sources of infection at the homes of the patients were excluded, and attention was of course at once directed to conditions of the school, but everything was found satisfactory there.

The period of illness of the various patients indicated the end of the first week in September, as the probable date of infection.

Inquiry elicited the fact that a village fair had been held in Knotty Ash, a suburb of Liverpool, on September 6th and 7th, and that every one of the children suffering from typhoid had visited the fair. An ice-cream and chip potato vendor was present, and all the children but three, admitted that they had partaken of his ice-cream. Of these three two had eaten only chip potatoes, and no ice-cream, and the other was too young and too ill to give any account of its proceedings.

It was then discovered that two children living at New Brighton (*i.e.*, some miles from Liverpool on the other side of the Mersey), but who had been at the Knotty Ash fair and eaten the ice-cream there, were lying ill at home with typhoid fever, and a few days later identical information was received with reference to a school boy at Denbigh.

These children had not attended, nor had they even entered the Knotty Ash school.

Instructions were issued to the Sanitary Inspectors to visit every ice-cream establishment within the municipality of Liverpool, to ascertain whether or no any person in connection with them had been to the Knotty Ash Fair, and if any sickness existed at their houses about that time.

The result of this investigation brought to light the fact that a certain Italian vendor of ice-cream and chip potatoes had been at the fair, and had his wife sick in the house at the time, which sickness proved to be typhoid fever. It was the second case in the house, the first having been notified and removed to hospital on August 11th.

That, therefore, was as far as we could get, no bacteriological examination of the ice-cream supposed to be the cause of the outbreak being possible at this distance of time. I think, however, you will agree with me that the chain of evidence was as complete as it was possible to be. The premises of the Italian were kept in a dirty state, and knowing the habits of these people, we can easily imagine how the ice-cream became infected.

Professor Boyce, the Corporation Bacteriologist, examined a sample of ice-cream from the shop of this Italian, and his report on it, as on many other specimens afterwards taken in various parts of the town, was "teeming with bacteria. Infinitely worse than ordinary milk which has stood for some time." Professor Boyce adds: "Some of the colonies grown on agar closely resemble forms which I have obtained from samples of sewage."

In due course Dr. Hope reported to the Health Committee that "the conditions of this Italian's premises may be taken as typical of the conditions existing in many places where ice-cream is made for hawking in the streets. Powers for the registration and supervision of such places are urgently needed. In the meantime, inasmuch as milk is an ingredient in the manufacture, the places where ice-cream is made will be dealt with in exactly the same manner as places where milk is sold."

An omnibus bill for Liverpool was about to be laid before Parliament, and in it powers for *licensing the persons* selling, and *registering the premises* used for the manufacture, storage, and sale of ice-cream and similar commodities were asked for.

For some reason the House of Commons Committee did not seem to view these proposals with favour. Many objections were raised, but in the end the clause approved of by the Committee and passed by Parliament was as follows :—

32.—(1) Any person being a manufacturer of or merchant or dealer in ice-creams or other similar commodity who within the City—

(*a*) Causes or permits ice-creams or any similar commodity to be manufactured sold or stored in any cellar or room in which there is an inlet or opening to the drain ; or

(*b*) In the manufacture sale or storage of any such commodity does any act or thing likely to expose such commodity to infection or contamination or omits to take any proper precaution for the due protection of such commodity from infection or contamination; or

(*c*) Omits on the outbreak of any infectious or contagious disease amongst the persons employed in his business to give notice thereof to the Medical Officer of Health for the City:

shall be liable for every such offence on summary conviction to a penalty not exceeding forty shillings.

The clause, though good as far as it goes, does not, it will be seen, give the Local Authority power to license the vendor as in the case of the Dairies and Cowsheds Order, nor to register the premises as in the case of the Liverpool Improvement Act, 1867, nor does it provide powers of entry for the purposes of inspection, &c.

At the same time, although there is no compulsion to be registered, the power possessed by the Health Authorities is really very little affected by this omission.

If the premises had to be registered, the Health Department would not do this unless the arrangements were satisfactory. At present, if the people apply, and are told their premises are unsuitable, or even if they make no application, if the Health Authorities consider that they are unsuitable, without further trouble an information can be laid, and proceedings taken under Section 32 of the Act. We usually warn the people once or twice to desist from carrying on the manufacture, and then, if they persist, we lay an information in the ordinary course. Soon, however, when the provisions of the Act become generally known, this "warning" will not be necessarily a preliminary to legal action.

The Liverpool Corporation Act, 1898, of which we are speaking, received the royal assent on August 12th, 1898.

Since that date to August 12th, 1899, 319 persons have applied directly or indirectly to the Health Department for permission to sell ice cream; 56 persons have been told that, owing to unsuitability of premises, &c., they should make other arrangements. 1,600 visits have been paid by the two Inspectors who look after this work. Three informations have been laid, two cases heard before the stipendiary magistrate, and two convictions obtained with fines of 20s. and 40s. respectively, and costs in each case. One case was withdrawn.

The stipendiary has in each case pointed out the serious character of the offences, remarking once that the best punish-

ment for the defendant would be to make him live on his own ice-cream for a time!

We have not thought it requisite to make any special regulations for the ice-cream trade. We regard it as a form of milk-selling, and carry out the new regulations applicable to that business made by the Corporation of Liverpool in 1897.

The procedure of the Health Department is briefly this:—The address of the premises being secured—whether by the occupant applying to the Health Office or from information obtained in other ways—a visit is paid by one of the Inspectors, and a report is made of present conditions, and the possibility or otherwise of adapting the premises for the purpose intended, also of the repairs, cleaning, &c., required.

If necessary, Dr. Hope or I then visit the premises, and the occupier is afterwards formally told whether they are or are not suitable.

A large amount of ice-cream is, of course, sold in shops supplying sweets, mineral waters, and other refreshments throughout the City. Most of these are already registered as milkshops, are under constant supervision, and, as a rule, require very little doing to them before commencing or continuing the sale of ice-cream.

Besides these, however, there are two other classes of manufacturers and vendors:—

(1) Large businesses for the wholesale manufacture of the material for supplying, for example, passenger steamers, hotels, and the like.

(2) Small traders, mostly, though by no means only, Italians, who as a rule manufacture and store the ice-cream and the ingredients of which it is composed under grossly insanitary conditions. Some of these traders have only a barrow trade, others do that and a retail shop business too—often combining the sale of fried fish and chip potatoes with that of ice-cream and other "delicacies."

With regard to these two classes, our aim has been to get the large manufacturer either to make his present premises thoroughly sanitary, or, failing that, to take new ones. In the case of the small trader, to get him to combine with others in the same business and to take some suitable building where they can all manufacture and store their ice-cream, instead of using their own houses.

In a very large number of cases this has taken place, but where for personal or other reasons a trader prefers to keep his business entirely to himself, he must then strictly conform to the regulations.

In conclusion, I would venture to suggest that pending the

passing of a general Act preventing the manufacture and storage of ice-cream under insanitary conditions, for which Act I fear we shall have to wait a long time, each Local Authority in whose district any considerable trade of this kind exists should apply for Parliamentary powers on its own account on the lines of, and, if possible, better than those granted by the Liverpool Act of 1898.

The reader of the paper concluded by describing and exhibiting plans of two typical premises where ice-cream was being manufactured under insanitary conditions, and of the buildings to which the offender in each case moved, as a result of the representation of the Health Department.

Councillor WILSON (Newcastle) said the Newcastle authorities also had obtained power during the last Parliamentary session. They had exactly the same difficulties to contend with in Newcastle as in Liverpool. They had certain powers, but not enough, and now Parliament had given them more powers. They wanted more control, and hoped to get that, but he was afraid it would take some time. However, it showed that corporations and authorities were becoming alive to the danger.

Dr. W. C. C. PAKES (London) said he had had an opportunity of examining a number of ice-creams, and had been associated with prosecutions. He could assure them that in London it was difficult to induce the magistrate to convict. Pending the obtaining of Parliamentary powers, it seemed that something might be done by members of the Institute by inducing those responsible for the administration of the law, to look a little more unkindly upon the manufacturers of ice-creams, who took no precautions. In one specimen examined it was found that there were twenty-eight million organisms present per cubic centimetre.

CONGRESS AT SOUTHAMPTON.
SECTION II.
ENGINEERING AND ARCHITECTURE.
PAPERS AND DISCUSSIONS.

The President's Address to the Section is given in Part III., page 374.

"*Storage of Flood Water*," *by* Professor HENRY ROBINSON, M.INST.C.E., F.G.S. (FELLOW.)

THE better conservation of the rainfall of this country is a national question, and demands at this time careful consideration. The population increases but the water which is available for their requirements does not increase, and every year there arises a struggle for watersheds from which to obtain the supply for the needs of the great communities centred in our towns, whilst the populations in villages too often depend upon shallow wells which are liable to pollution. An ideal state of things would be realized had the whole country been mapped out into watershed districts under a Department of State, by which a careful study of the physical geography and of the hydrogeological conditions of the country would have led to a more equitable and systematic utilization of the rainfall than has hitherto obtained. The rivers and watersheds could then have been utilized on some definite system to ensure the conservation of the water, and to avoid the appropriation of important gathering grounds for comparatively small purposes.

There is a grave need of well-considered and comprehensive treatment of watersheds, so that flood waters are stored, thus rendering the flow of the rivers more equable and the excess water, which now does mischief by causing floods, be made available for domestic supply, for irrigation, for improving navigation (either in river or in canal systems), for power purposes, improving the working of existing mills, and in founding new industries.

An initial difficulty will be encountered in regard to the cost of constructing works for storing flood water, as the incidence of rating does not admit of simple adjustment. The owners of the high-level lands may not unnaturally object to pay for the construction of storage reservoirs which would both prevent the

flooding of low-lying property, and also provide water to be employed elsewhere. They might even claim to reap some direct benefit of a financial kind on account of being the happy possessors of table-lands receiving rainfall which has so great a value in view of its admitting of conservation for national purposes. The interests of riparian proprietors and property owners being divergent, the solution of the problem must be difficult. In legislating to secure the storage of flood waters it would be necessary to constitute an Authority free from the sphere of local influence and conflicting interests.

Where Conservancy Boards have been formed, the object of their establishment has been chiefly, either to maintain the river for purposes of navigation, or to prevent its pollution by manufacturing or domestic refuse.

In Ireland legislation has taken the shape of forming drainage districts to free from floods the lands which previously were subject to them. The necessary works have been either in strengthening and improving beds of rivers, or in draining lands. There the necessity for conserving flood waters for the use of increasing populations in industrial centres has not been the same as in England. I refer to it because the difficulty which was experienced of getting assents in the required proportions to ensure the work being done supports my view of the necessity for the Authority being a central and not a local one. The numbers representing the lands liable to floods were often small compared to those whose lands were above the influence of floods, so that a deadlock arose.

In Holland, Boards have been in existence for a long time; as some artificial system of drainage was necessary for the bulk of the land. The local arrangements for dealing with each area in regard to controlling the flow of water were settled by Executive Boards, with the right of appeal from their decisions to a Central Authority.

The great question of the future supply of water to London being really a national one, I would briefly refer to it by stating that I am quite confident the right solution of it will be found in storing the vast volumes of water which pass off the watersheds of tributaries of the Thames. Natural valleys afford admirable storage for water which now runs to waste, but which can be utilized at moderate cost to meet the requirements of the Metropolis for all time.

Frequently recourse is had to underground water by establishing pumping stations, and relying on the absence of any legal right to such water. This source of supply, however, has been in several recent cases hampered by conditions involving compensation to those whose wells might be injuriously

affected by the abstraction of subterranean water, where parliamentary power has been sought to carry out such works. Although the law of the land gives no property in underground water owing to the inability to identify it (Chasemore v. Richards' case governing the question), there can be no doubt that the law operates most inequitably. Anyone can buy a plot of land, and can sink a shaft and pump water from beneath the surface without any obligation to compensate those whose supplies are affected.

In this connection I would mention that where the direction of flow of underground water enables samples to be taken of water to which Lithia has been previously added, the water can be identified, the peculiar band produced in the spectroscope by Lithia being recognizable.

It was once thought that the admission of flood waters into storage reservoirs would permanently affect the purity of the water thus impounded, on the assumption that the causes of pollution would tend to increase. Hence the treatment of watersheds, and the construction of reservoirs, were based on the principle of excluding large volumes of water which have been sent to waste.

Many years ago, in dealing with this subject, I stated that "It has often been contended that organisms injurious to health, derived from sewage decomposition, continue to live after their discharge into a river, and are practically incapable of being destroyed. Alarmists have relied on this in support of the contention that no river water is fit for dietetic purposes. I think this view has been overstrained. Is it not a reasonable assumption that these organisms may be quite incapable of existing when favouring conditions cease? This must be the case when, after they are cast into a river with the filth they thrive on, the whole becomes largely diluted, its temperature altered, and a state of things produced very different from that which previously existed." The recent enquiry about London water led to the expression of opinion that "When pathogenic bacteria pass into the outer air or water they are in an unnatural medium in which they can only maintain their existence and power of multiplication for a limited period during which they undergo more or less rapid attenuation or loss of virulence and become generally weakened."

The influences which are at work to destroy, or render inert, the undesirable matters in such waters are well recognised. The lower temperature of rivers is unfavourable to the cultivation of germs, which originate in media of high temperatures; harmless bacteria appear to deprive the hurtful ones of conditions necessary to their propagation, and so lead to their

destruction. Minute organisms which thrive and multiply on organic matters act as scavengers. Aquatic plants, which liberate oxygen in the presence of light, aid in effecting the purification of waters that are not pure. In a storage reservoir receiving flood waters, all suspended matters carry down and help to destroy hurtful matters.

It has been proved that a river water which has had some polluting matter in it has become "inoculated," and is less capable of the cultivation of organisms than pure moorland waters (so often alleged to be the only true source of supply), which are very favourable to their cultivation and propagation.

I refer to this fact because it has a very important bearing on the question of storing flood waters. The fact that such waters are now admissible into reservoirs which are intended to supply drinking water enables the subject to be dealt with more easily, as well as more comprehensively than heretofore, when there was a ban upon the admission of any water the character of which was not absolutely irreproachable.

A few words may be interesting in regard to the variations in rainfall which affect the conservation of water for prevention of floods, and for utilization for the purposes previously referred to.

The mean or average rainfall, and the fluctuation of rainfall, have to be studied, and it seldom happens that records are available over long periods, and if records over only short periods are relied on, great errors may arise. We are indebted to Sir Alexander Binnie for the valuable statistics which he brought before the Institution of Civil Engineers a few years ago, from which the following tables can be deduced, taking the records of periods from 1 to 35 years.

Period of records in years.	Percentage of deviation of the mean annual rainfall of the period from the *true* mean annual rainfall.	
	Above	Below
1	51 per cent.	40 per cent.
2	35 "	31 "
3	27 "	25 "
5	15 "	15 "
10	*8·22 "	8·22 "
15	4·75 "	4·75 "
20	3·24 "	3·24 "
25	2·75 "	2·75 "
30	2·26 "	2·26 "
35	1·78 "	1·78 "

* Thus if records are available over a period of ten years the error in estimating the *Mean Annual Rainfall* therefrom is not likely to exceed 8·22 per cent.

It has also been ascertained that in stations where the mean was under 20 inches the fluctuation was rather larger than in ordinary cases. Summarizing the averages of a great many stations over long periods in percentages of the Mean Annual Rainfall, the following table gives the result:—

	Wettest.	Driest.
Single year's fall	1·51	0·60
Average fall of 2 consecutive dry years .	1·35	0·69
Average fall of 3 consecutive dry years .	1·27	0·75

At Greenwich, where the mean annual rainfall is 25·04, the ratio to this mean is as follows:—

Average for 3 dry years.	Maximum.	Minimum.
·81	1·45	·67

We must aim at the retention in reservoirs of the water off gathering grounds when rainfalls of from 2 to 6 inches in 24 hours occur (which have been recorded in this country doing great mischief) and the smaller falls over longer periods, during which the bulk is passing to waste. Such floods have been found to yield volumes, of which the following may be given as instances:—

	Per sec. per sq. mile.
Manchester gathering ground ...	160 to 256 cubic feet.
Loch Katrine " ...	80 "
Belfast " ...	34 "
River Clyde " ...	64 "
River Derwent (above Derwentwater) gathering ground ...	about 500 "

To store flood water for the benefit of the community is a task which deserves prominent consideration at this Congress, and I trust that this brief communication may serve to advance this important matter.

The President of the Section (Alderman J. Lemon) remarked that the rights of people to underground water were to be protected. Parliament now recognised that fact. Southampton had an excellent supply of water from Otterbourne in that way.

Professor Robinson said he did not anticipate discussion on the paper. His object would be served by having his views placed on record.

"Cisterns, their use and necessity with constant water supply," by ERNEST COLLINS, M.Inst.C.E.

THE provision of cisterns for the storage of water used in factories and private dwelling houses is absolutely necessary to enable the consumer to obtain an uninterrupted supply of water in the event of temporary stoppage of supply, caused by accident or unforseen circumstances.

The constant supply of water cannot always be maintained without interruption owing to various causes, such as leakage from, or breakage of main pipes, communication pipes, lead pipes, and internal house fittings, and in some instances through a partial failure of the supply.

Such failures have occurred at various times in nearly all our large towns, and in numbers of small towns and villages, resulting in a partial or restricted supply, necessitating the shutting off of the water for varying periods of the day and night.

The abolition of cisterns has been found to be very detrimental where a restrictive supply has of necessity been resorted to.

In houses of the smaller class inhabited by the very poor, the want of proper receptacles for the storage of water is very inconvenient.

It is quite customary in business premises, factories, and large dwelling houses, to provide cisternage of sufficient capacity to guard against interruptions of supply, and it is imperative that cisterns should be provided for supplying water for the use of steam boilers, hot water boilers, w.c.'s and urinals. This is provided for in nearly all Acts of Parliament and regulations relating to water supply.

As to the provision of reservoir cisterns in small dwelling houses, the author is of opinion that cisterns of sufficient capacity for at least twelve hours' supply should always be provided, and all the water fittings in the house should be supplied therefrom,—a draw-tap attached to the main supply pipe being provided for drawing water for dietetic purposes.

As regards the size of storage cisterns, there is considerable conflict of opinion as to the capacity to be provided: a convenient form of calculation is a specified quantity, say 20 gallons per room of house or tenement, this for a house of six rooms would give the storage capacity as 120 gallons, by no means an excessive quantity.

The practice of supplying dwelling houses without cisterns

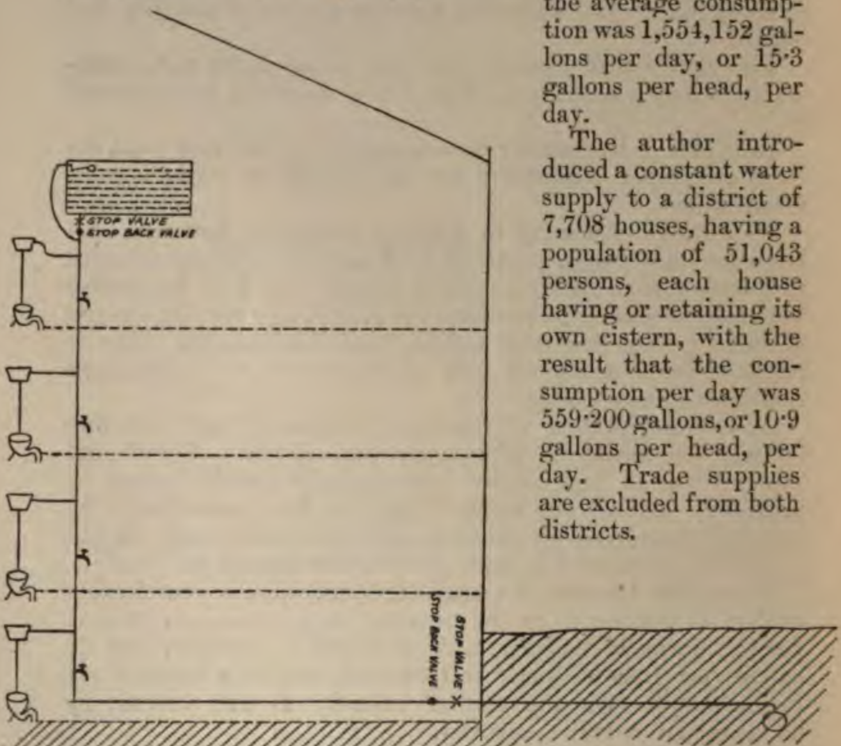
causes the consumers to place ordinary washing tubs under the draw-taps to guard against an interruption of supply, and during the time the water is shut off, all manner of objectionable utensils are dipped into these tubs.

In some towns to obviate the inconvenience arising from an interruption of the supply through the shutting down of mains, notice is given in local papers, etc., that the water will be shut off for so many hours on certain days in each week to enable repairs to be carried out. This causes consumers whose premises are not provided with cisterns to make other provision in the shape of a washing tub as described above.

Even under this system the water has often to be shut off at other times for the repair of fractured mains, etc.

The abolition of cisterns also causes a large waste of water, as the draw-taps over the tubs are usually left partly open.

As an illustration of the wastefulness of this system in London, constant supply was introduced without cisterns to a district of 13,282 houses, having a population of 100,930 persons, and the average consumption was 1,554,152 gallons per day, or 15·3 gallons per head, per day.



The author introduced a constant water supply to a district of 7,708 houses, having a population of 51,043 persons, each house having or retaining its own cistern, with the result that the consumption per day was 559·200 gallons, or 10·9 gallons per head, per day. Trade supplies are excluded from both districts.

These figures tend to show that from an economical point of view the provision of cisterns is desirable.

In some instances cisterns are provided, and the supply pipe to same is also made to act as draw off pipe, as shown in the preceding sketch.

In this plan the whole of the fittings are supplied from the main until an interruption of supply occurs, when the stop back valve nearest the main closes, and the stop back valve nearest the cistern opens, and supplies the fittings from the cistern.

This system is very objectionable in practice, as in the event of the water not being shut off in the main for a long period, the water in the cistern becomes stagnant, and upon the water being shut off this stagnant water is supplied to the fittings for the use of the building.

It however finds favour with some builders, as the cost is lessened by reason of not having to provide a second or draw-off pipe.

In providing and fixing cisterns great care is required to obtain a good circulation of water through the same, and the provision of too large a cistern is nearly as bad as the preceding plan.

In small dwelling houses and tenements, twenty gallons per room is sufficient, and in large houses, thirty gallons per room will not be excessive.

Factories, business premises, stables, etc., require sufficient storage for at least twenty-four hours supply.

The system recommended by the author where cisterns are provided, from which fittings are supplied, is as follows :—

A communication pipe is taken from the main to the premises, a screw-down stop valve being provided at the entrance. This pipe is carried to the cistern and attached thereto, and before reaching the cistern there are one or more draw taps for drawing water for dietetic purposes only.

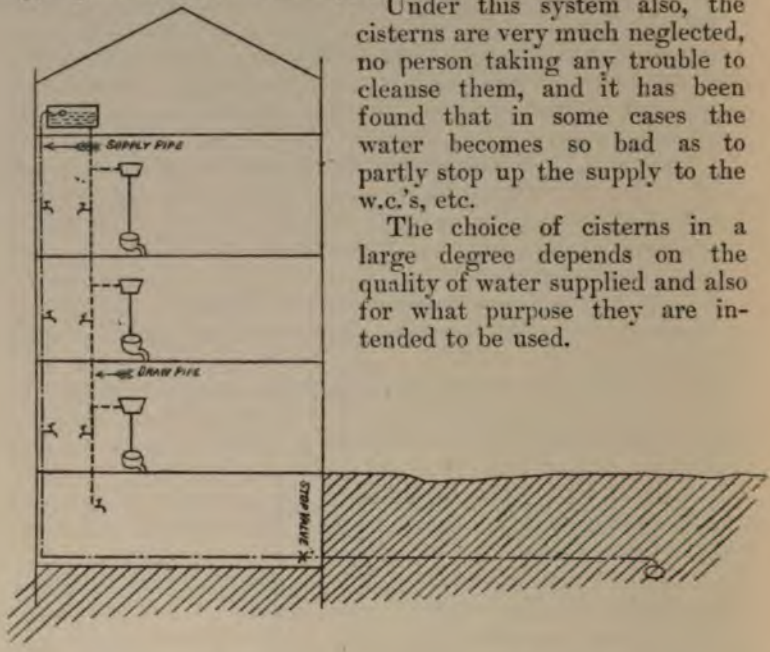
The remainder of the fittings supplying w.c.'s, urinals, taps, etc., are supplied by a separate draw-off pipe from the cistern.

By the adoption of these arrangements the water is kept circulating through the cistern for use of urinals, w.c.'s, etc. and in the event of an interruption of the water supply, the occupiers are enabled to continue to use water for sanitary and other purposes, uninterruptedly for at least twelve hours.

In another system, adopted in some cases, the whole of the draw-taps for drawing water are supplied from the main supply pipe, and the fittings supplying w.c.'s, urinals, etc., are supplied from the cistern.

This system, no doubt, has its advantages, but when the supply is interrupted the occupier can continue the use of

water for sanitary purposes only, and is unable to obtain any water for other purposes without, as frequently happens, dipping out of the cistern supplying closets, etc.



Under this system also, the cisterns are very much neglected, no person taking any trouble to cleanse them, and it has been found that in some cases the water becomes so bad as to partly stop up the supply to the w.c.'s, etc.

The choice of cisterns in a large degree depends on the quality of water supplied and also for what purpose they are intended to be used.

For hard water, the ordinary galvanized cisterns are extensively used, and last many years: these are usually sold without covers, and are generally provided with covers of wood, zinc, or other light material.

Wooden cisterns, lined with lead or zinc, slate cisterns, and stone cisterns, are all provided with covers similar to the galvanized iron cistern.

Lead and zinc-lined cisterns, and those made of slate and stone are not now generally used, and are gradually being replaced with the galvanised cistern.

Water-butts are prohibited by nearly all water works regulations and are nearly extinct.

The closed cistern to withstand the pressure of the street mains, being very expensive is very little used, and when connected with heavy pressure is highly dangerous: also no provision is made for cleansing, and it appears to be unsuitable for general use.

An improved "self-cleaning air-tight cistern" has been

devised by Mr. Hugh Alexander, Chief Sanitary Inspector for Shoreditch. This cistern is expensive, but it is undoubtedly a valuable improvement in domestic water cisterns. It has been adopted in the design first advocated by the London County Council for its new model dwellings at Millbank. It is a most excellent and practical cistern. In filling water-bottles, the tap should be allowed to run for a moment, so as to flush the sediment out from the leaden pipe before the bottles are filled. Bright water from the iron cistern is then obtained. It is a very good cistern, but at present its cost appears to limit its general use.

The galvanized iron and wooden cisterns lined with lead or zinc are unsuitable, and dangerous for soft water.

Slate, stone, cement, and other compounds of a like nature are alone suitable for soft water.

The position of cisterns is one which requires special attention, and some of our architects appear to have forgotten to make provision for their reception, and cisterns are fixed in any available situation, inaccessible to the ordinary occupier for cleansing and inspection.

The practice of fixing cisterns on the roofs of buildings, even in the rare cases where means of access are provided, is very objectionable, as these cisterns, although covered, are usually unprotected from frost and the sun's rays, and are rendered useless by a slight frost.

Cisterns in these positions should be well protected against the effects of frost, and tight-fitting covers provided.

Another common practice is fixing cisterns in roofs. They are unseen and their existence is often unknown to the occupier.

Still another objectionable practice is fixing cisterns under floors—in some cases under bedrooms, and even under w.c. floors—and allowing soil pipes or drain ventilating pipes to pass through cisterns.

Cisterns should be placed where they can be seen, and should be readily accessible for periodical inspection and cleansing, and it should be the duty of our sanitary authorities to see that the cisterns are placed in such suitable positions.

It should also be the duty of waterworks authorities, through their staff, to give notice to the sanitary authorities of the existence of dirty cisterns in order that notices may be served for cleansing.

As regards the cleansing of cisterns, it is difficult to secure good administration on the part of all householders in respect to the care of their own water cisterns; and to some extent the regulation of the water companies requiring an overflow warning pipe, but allowing no standing waste of any sort, make it im-

possible to clean out the cistern by direct flushing. This regulation might be modified with advantage. In no case ought a cistern to be so constructed that it cannot be emptied except through the drinking water taps. It is very difficult to effectively clean out a cistern, except through a standing waste so inserted as to completely empty the cistern, and to allow it to be flushed out effectively by the supply tap, while the sides and bottom of the cistern are lightly swept down with a soft hand broom. The pipe for the service of the drinking water taps should in all cases be an inch above the bottom of the cistern, so as to allow a thin layer of sediment to subside below the level of the drinking water outlet. This condition alone renders it impracticable to efficiently flush out sediments through the drinking water taps. A standing waste, leading to the warning pipe, is the best arrangement. In case of overflow the proper warning is then given; while by simply lifting the standing waste the cistern can at once be flushed out perfectly. Of course the standing waste must in no case have any sort of communication with a drain pipe. A rubber garden hose pipe may be attached to the end of the warning pipe while the cistern is being flushed out, and in that way the flushing water can be discharged over a trapped gulley at a convenient point.

Mr. Edwin T. Hall (London) said it seemed to him to be desirable to have water fresh from the main for dietetic purposes. It was wrong when the mains were up for repairs that people should have to take advantage of the various schemes mentioned by the author in order to get water for dietetic purposes. There was no reason why a cistern should not be perfectly clear. A cistern might be made as a big bulb on the supply pipe, and when so arranged there would always be a current through the cistern, and this arrangement would be free from the objections made to most types of cisterns, which facilitated the accumulation of large deposits. He proposed a vote of thanks to the author.

Mr. James Munce (Belfast) seconded the proposition, and said that, generally speaking, there was a great objection to cisterns which sometimes became the last resting place of cats and rats when placed in dark nooks. Unquestionably, he thought a cistern was necessary in every house to hold one day's supply, but not more. In case of any sudden emergency, every householder should have one day's supply at hand. The cistern should be easily accessible and frequently examined.

"*Developments in Hospital Planning and Construction resulting from the employment of 'Plenum' Ventilation*," by WILLIAM HENMAN, F.R.I.B.A.

IN introducing this subject to your notice, I feel bound to revert to what some here present may consider ancient history, and must crave their indulgence for the sake of those who are not so well informed on what has occurred in the past, fearing that without preliminary explanation the latter may fail to comprehend the reasons for proposing developments in hospital planning, or to realise the important bearing such may have on the future of many of our noble institutions.

The intelligent planning of hospitals has advanced line by line with knowledge of the necessity for good ventilation, and consequently we may fairly look to improvements in methods and means for securing efficient ventilation to suggest further developments in plan and construction.

I do not for a moment mean to imply that ventilation alone has to be considered in hospital design, but there is no doubt it has had the greatest influence in regulating the general disposition of the wards, and therefore of the architectural treatment of buildings designed for the purpose. Efficient lighting and the necessity for absolute cleanliness in every part, are of the utmost importance, and have exerted a considerable effect in determining the design, arrangement, and construction of such buildings.

What is commonly known as the "Pavilion" plan is an arrangement with windows on both sides of wards sufficiently wide for a double row of beds and a central gangway. The Pavilion may be of one or more storeys, either detached or connected at one end only, to a corridor or other buildings. This system of plan was first advocated by Mons. Tollet, a French architect, about the middle of the last century, and has of late years been very generally adopted in this and other countries, principally because it is the best form yet devised for hospitals, where *natural* means are employed for securing ventilation.

In small hospitals, situated in salubrious districts, having but few beds in each ward, ample space around externally, and efficient warming appliances, there is no reason to suppose that, with proper care and management, patients cannot be nursed with safety and comfort; but for larger hospitals in less favoured localities there is good cause for doubting whether a proper

amount of ventilation can at all times be secured by *natural* means, even in the best constructed wards, planned on the "Pavilion" principle; and experience has proved that with the "block" and "corridor" arrangement a healthy condition is most difficult to maintain. Moreover in large hospitals, planned in pavilions, excessive labour is involved by the considerable distances apart of the several portions of the buildings, and great difficulties are experienced in securing adequate supervision; there is also a frequent demand for better ventilation, particularly at night time and when the condition of the outer atmosphere is such that windows on opposite sides of the wards cannot be freely opened, as well as in close, hot weather, when movement of the outer atmosphere is insufficient to cause adequate change of air within.

This demand has led to the employment, with varying success, of numerous means for securing change of air, independently of open windows. Power and appliances of some kind or other must then be employed. Fuel, consumed in open fireplaces, at the base of ventilating shafts or under boilers from which steam or hot water coils or radiators are heated, brings the force of gravitation into play. A portion of air becoming rarified by heat is forced upward by the pressure of colder, and consequently heavier air, around. These means, although popular, are extravagant and uncertain in securing the desired end. The same amount of fuel, employed in conjunction with suitably designed mechanical appliances, is capable of far better and more reliable results, apart from which these appliances are nearly all unsuitable for use in hot weather and cannot secure comfortable lowering of temperature within buildings.

"Air-propellers," commonly known as "fans," worked by steam, gas, or electric motors, are now generally employed, either with a view to extracting the vitiated air or for propelling fresh air into the buildings. Careful comparison between the results of these two methods of "*propulsion*" and "*extraction*" decides in favour of "*propulsion*" for hospital purposes; because when air is propelled into a building the source of supply can be chosen, the air can be cleansed, tempered, and brought to a suitable hygrometric condition without the necessity for having apparatus of any kind within habitable parts of the buildings, unpleasant draughts are avoided and the effectiveness of appliances for changing the air is fully utilised. This is known as the "Plenum" system, and for some time past has been in successful operation in several hospitals, asylums, schools, and other buildings.

There is one condition essential to the success of the

"Plenum" system of ventilation, viz., that both the inflow and outflow of air from the building must be absolutely under control; consequently it does not permit the opening of windows. Several years of experience have demonstrated that, with efficient means for securing ventilation on the "Plenum" system, window opening can with actual advantage be dispensed with, consequently the principal *raison d'être* for the "Pavilion" arrangement of plan disappears; and, provided light and cheerfulness can otherwise be secured to the wards, there is no necessity for side windows nor for any intervening space between ward and ward, because their air supply is drawn from an independent source and expelled at a distance from such source.

The realisation of these facts led to a correspondence in *The Builder* just three years ago, when several writers advocated a change of plan, principally with a view to the attainment of better architectural effect in hospital buildings, by the employment of double wards with a dwarf partition down the centre. I then ventured to make known my views in the following communication.

To the Editor of THE BUILDER.

ON THE PLAN AND CONSTRUCTION OF HOSPITALS AND INFIRMARIES.

SIR,—Although the time may be at hand when it will be possible, by the employment of scientifically-applied means of ventilation and of the antiseptic treatment, to adopt an arrangement of plan differing from single-ward pavilions, the question demands closer examination than "F.R.C.S." and "Architect" appear to have devoted to it, for fear of a retrograde movement.

The point upon which they place so much stress—viz., architectural effect—is of slight importance to the welfare of patients and of ease in administration, which in a hospital ought to receive first consideration, and other reasons given for reverting to double-ward pavilions are trivial. In fact, I venture to say that by far the majority of those who have had practical experience in hospital work will condemn the dwarf central division, because it obstructs a full view of the beds, and because it is not possible to so thoroughly light a wide ward: for it must be remembered that, although in a single ward a patient now and then may be inconvenienced by glare of light, that light is, in effect, the great health-giver to by far the majority. Ventilation, by whatever means secured, becomes more difficult in a large area, and a central division must retard free circulation of air: moreover, such enlarged spaces would demand greater height, which would further increase the difficulty of securing efficient ventilation, and add to cost as well as to labour in getting from one floor to another.

The real disadvantage of the pavilion plan, particularly in some of the large and recently-erected hospitals, is that of administration, in consequence of the great distances which have to be traversed by the staff; the direction, therefore, in which advance should be sought is concentration of wards, which becomes possible with an efficient system of ventilation and the employment of antiseptics.

Hospitals and infirmaries may be considered "health manufactories," and the arrangement of plan should, as in an ordinary manufactory, principally be considered with a view to perfection of work and its accomplishment with ease and despatch.

What I would suggest is that instead of erecting detached pavilions of several stories, it might be better to spread out the wards on one story only, placed side by side and lighted by continuous lantern lights. Such an arrangement would secure greater comfort to the patients, simplify ventilation by mechanical means, and very considerably reduce corridor communication, as well as dispense with the inconvenience of staircases and lifts, thereby facilitating administration.

For the accommodation of the staff there would be no objection to buildings of several stories, but with all the patients compactly arranged on one floor level their wants could be easily supplied, and other difficulties of the pavilion plan would be overcome.

I am fully aware that only those who study what is possible with the plenum system of ventilation properly applied can realise the practicability of such an arrangement; yet by its employment I feel convinced that some such revolution in hospital planning will be accomplished, and do not doubt that in time it will be demanded, partly in consequence of the great cost of the pavilion plan, but more particularly in consequence of the excessive labour thereby involved.

WILLIAM HENMAN, F.R.I.B.A.

8th August, 1896.

Little did I imagine when I penned those words that it would ever fall to my lot to design a building for erection on the lines then proposed; they had, however, attracted attention, and, when, after a careful comparison of my work at the General Hospital, Birmingham, with other recently erected Hospitals, the Committee, previously unknown to me, determined to place in my hands the preparation of designs for the Belfast Royal Victoria Hospital, providing accommodation for three hundred beds, I found a majority at least in favour of considering a design based upon the suggestion I had made, and as the work has proceeded, I have been most gratified to realise how those who in the first instance put forward objections have one by one been converted, and now look favourably upon the scheme. This is the more remarkable because the absolute novelty of the plan so entirely revolutionises precon-

ceived ideas as to what is essential in Hospital design, and for that reason I have considered it of sufficient importance, from a Sanitary point of view, to introduce it to the notice of this Congress, for it may now be regarded not simply as an abstract idea, but one which ere long will be carried out in a practical manner; and, it is almost needless to add, when so large an outlay is involved, that the most anxious consideration will be given to every detail in the hope that results may warrant the favourable opinion which has been formed of it by those who have studied the matter and have made themselves responsible for its success.

In addition to the ordinary requirements of a hospital, provision has had to be made for a large medical and surgical school, and I may mention that in some particulars, hospital-practice in Belfast, if not elsewhere in Ireland, differs from what we are accustomed to in England. This, however, is a point that it is not necessary to discuss on the present occasion, although I am of opinion that the variations are worthy of consideration by those who are interested in hospital work on this side of the channel.

The principal novelty in this plan is that the wards and their accessory rooms are placed side by side, with no open space intervening. They are all on one floor level, and practically under one roof, and are approached by short corridors branching off a main corridor running at right angles to the length of the wards.

There are eight wards of 16 beds each for medical cases, also eight wards of 16 beds for surgical cases; one ward of 16 beds for gynœcological cases; two wards each of eight beds for ophthalmic cases; a large out-patients' or "Extern" department; pathological department and lecture theatre, all on the ground floor level. The administrative buildings of four storeys above a basement, including the nurses' home, are on the north side of the main corridor. It was a requirement that each of the hon. physicians should have control of a male and female ward adjoining each other, and that in connection with each group of four medical wards there should be a large class-room and a clinical room. Also that each hon. surgeon should have control of a male and female ward side by side, in connection with which there should be an operating room with anæsthetic room adjoining. For use in connection with every ward of 16 beds there is a single bed ward, a bath-room, lavatory and conveniences, also linen and clothes stores. A ward kitchen serves for each pair of wards, except for gynœcological cases, where the department is self-contained, with separate operating room.

The axis of the wards is almost north and south; to each of the sixteen bed wards there is a large window at the south end opening on to a covered balcony, from which there is a view over park-like premises to the hills beyond, and from end to end of the wards there are lantern lights, glazed on the almost vertical sides. As the buildings will not be overshadowed, sunlight can be admitted throughout at all times, regulated according to requirements by draw-down blinds. It is believed that wards thus lighted will be even more cheerful than with windows along the sides, and that they will generally afford greater comfort to the patients.

The compactness of the plan not only simplifies administration and reduces labour, but it lends itself to the "Plenum" system of ventilation far more readily and with more certain results than when buildings are of several storeys. The main air ducts are under the corridors, from which separate flues are carried up to the several wards, rooms and corridors, the air outlets are at the floor level, with flues descending to ducts by which the vitiated air passes to the open through ventilating turrets at the ends of the wards. By this arrangement all ducts and flues will be easily accessible for cleaning, and each ward and room is practically isolated from every other in consequence of each receiving its own fresh air supply direct. There is no necessity for "intercepting lobbies" between wards and conveniences, because air from the latter is not allowed to travel to the former.

The air intake is at the east end of the main corridor, and provides for a supply of cleansed and tempered air, ten million cubic feet hourly in volume, equal to a total change of air ten times per hour night and day throughout the buildings.

Time will not permit me to give you a detailed idea of how all this is accomplished, but I may say that it will be by means of a newly-designed air propeller of entirely different form and construction to the bladed fans hitherto employed for such purposes.

After careful consideration it is proposed to employ two fans to do the whole of the work required; served by duplicate engines to run alternately in order that one at least may always be available. Several other modifications of what has hitherto been done will be made in the cleansing and warming appliances, and from calculations made it is estimated that the working expenses should not exceed one-half those of any installation as yet laid down. Should our surmise be only approximately correct, and I believe it will be found we are not taking an over-sanguine view of possibilities, a great advance will undoubtedly be made upon what has hitherto been accomplished,

particularly as regards economy—an advance which ought to give a stimulus to the employment of "Plenum" ventilation, because it is more often than not a question of annual expenditure which determines whether or no it will be employed. The necessity for it is acknowledged, but so far it has been regarded an expensive luxury, consequently I lay stress on economy in working, but discountenance reduction in first cost at the expense of efficiency.

On looking back to the opposition from many sources which faced me some six years since, when it became known that the General Hospital, Birmingham, was to be ventilated throughout on the "Plenum" system, and I call to mind the many "high authorities" who, having predicted utter failure, are now able to realise it is an acknowledged success, I cannot suppose that the bolder step now to be taken will meet with unqualified approval; and yet, although I am far from presuming that absolute perfection will be attained, I feel thoroughly justified by previous experience in attempting to design a hospital specially adapted for the employment of "Plenum" ventilation. Reasonable criticism, based on knowledge of what has already been accomplished, I court to the fullest extent, and shall be greatly obliged to any whose suggestions may help to guard against mistakes which would mar the success of the undertaking.

In thanking all who have so far aided me in this matter, I take this opportunity for expressing my appreciation of the valuable assistance rendered by my partner, Mr. Thomas Cooper, whose name has, by the Executive Committee, been associated with my own in the carrying out of the work.

Mr. T. Blashill (London) said that he could not offer any criticism based on experience in this connection, but it appeared to him that one advantage of the system described was that they could control the kind of air that they let into each room. Mr. Henman had no doubt considered this matter. Was it not possible to control the whole system, if necessary, where it might be found that the air suitable for one ward would not do so well for another ward? It would be a matter well worth trying. They were indebted to Mr. Henman for his very instructive description of this novel way of constructing a hospital.

Mr. Edwin T. Hall (London) said that the plenum system of ventilation had one advantage which no other system had, and that was, that they were able in summer to keep the temperature of the room lower than that outside. But ventilation was not everything;

and Mr. Hall thought the effect on a nervous person of being in a room with no windows would be most depressing, and would tend to retard his recovery. Mr. Henman claimed for his design of the Belfast Hospital greater concentration for administration. He was not sure that the concentration could not be obtained in another way, and he was not sure that great concentration was an unmixed blessing. It was necessary that the nurses should have fresh air and exercise in going to and from their rooms to their meals. They were going to supply air to this large hospital by means of hundreds of flues, which could not be easily got at for the purpose of cleaning. It might be said that the volume of passing air kept them clean; but there must, he thought, be deposits more or less in them. What was to prevent insects congregating in them, or in fever hospitals, why not bacteria? He had a great objection to covered air-ducts which never saw the light at all. With reference to the question of cheerfulness, that ward, to them, was an admirably lighted room; but the fact that many persons had to live in a room that was only sky-lighted was objectionable. Mr. Henman said they could not open windows both sides of a pavilion if there was a gale of wind. They did not in practice open both sides, but one side only. This hospital would be a good and cheap one, but the cost and maintenance must be heavy. Having to deal with such a large system during many months when no artificial means would be required, must be very costly. This was a subject of such importance, that they would all watch with the closest concern the realisation of Mr. Henman's plans. He noticed that Mr. Henman did not treat the staff in regard to ventilation in the same way as the patients. If medical men had such a belief in this system, why did they not take their own physic? Mr. Henman's hospital in Birmingham was said to be a great success, but he (Mr. Hall) wanted to see how it would work in ten or twelve years' time, and what would be the result if some infectious disease got hold of a ward. Another point on the Belfast plan was that, if a ward caught fire, there was a danger of the fire being communicated to other wards. Of course, he knew the building would be practically fire-proof, but there had been fires in such places.

Dr. Christopher Childs (London) asked if experiments had been made showing that the incoming air was distributed uniformly and without the creation of draughts.

Mr. Henman: Yes.

Dr. Childs dwelt on the importance of securing uniformity of the distribution of the incoming air throughout the wards. It was very satisfactory to hear Mr. Henman's testimony with regard to the success of the plenum system of ventilation. As a rule, their public buildings, such as churches, theatres and schools were not ventilated at all. The so-called "systems of ventilation" generally consisted of eccentric methods for turning on draughts; whereas true ventilation implied the supply of sufficient pure and fresh air without

the production of draughts or any discomfort. So far as he had studied the plenum system, it seemed to offer the best prospect of solving the many practical difficulties connected with ventilation. By means of this system they could control the quantity of air supplied, could sift, moisten, heat, or cool it; and all this in a very simple way if the system was adopted whilst the building was in course of construction.

Dr. J. R. KAYE (Wakefield) asked for some information as to the cost. He would like an answer to this question. If a hospital about to be erected, and provided with ventilation and warming in an ordinary way, cost say £300 per bed, what would be the additional cost, if any, to introduce instead the plenum system?

Mr. JAMES MUNCE (Belfast) said that one thing Mr. Henman had omitted to say which might perhaps make things more clear in regard to the light. This hospital was practically on the side of a hill 150 feet above the level of the sea, whilst the hills rose some 1,000 feet behind it. The patients could see the hills from their beds, on the one side, and could see the Mourne mountains through the skylights, as they had termed them, on the opposide side, if a clear day. This was not intended to be an infectious hospital at all.

Mr. HALL: In case infectious cases accidentally got into the ward, Mr. Munce said he did not think any danger was to be apprehended if the system was rightly managed, and there was a good current of air maintained *from* the apparatus *into* the ward.

Mr. WHITBREAD (Carlton) said he would like to ask if the flues near the bottom end of the main trunk received more air than those further away. How was it controlled? Would Mr. Henman also adopt the same grouping of rooms for infectious hospitals?

Mr. W. HENMAN (Birmingham) said, on this occasion it was impossible to go fully into the details of plenum ventilation. Most of the difficulties and fears alluded to by the several speakers were purely imaginary and need not exist with a properly devised installation, suitably maintained. Regulation of the supply of air and temperature in various parts of a building is a simple matter. In the Birmingham General Hospital a temperature of 62° to 64° (Fahr.) in the medical wards and of 60° to 62° in the surgical wards is aimed at and fairly maintained. In hot weather the hospital is one of the most comfortable places to be in, although not an ounce of ice is employed for keeping down the temperature. The medical and surgical staff speak of the result as perfect from their point of view, because they know the good condition of the atmosphere in which their patients are placed and that they are not subjected to draughts. Although in the proposed Belfast Hospital the wards are placed side by side there need be no risk of the spread of infection, because each ward and room is separately supplied with fresh air and the outgoing air

is independently discharged. And as regards risk from fire, surely it would be less with all the patients on one floor level than on several, independently of which fire-resisting construction will throughout be employed. It is reasonable to ask why it is proposed not to extend the plenum ventilation to the Administrative Department and Nurses Home? The answer is simple. The staff and nurses will number about 150 individuals, for whom are required several sitting-rooms and a bedroom for each. It is practical to ventilate and warm such a number of rooms on the plenum system, but experience has shewn how difficult it is to meet the varying constitutional requirements and fancies of so large a number of individuals, many of whom have, by previous training elsewhere, imbibed the idea that ventilation can only be effected by opening windows. Apart from this, their rooms —unlike the hospital wards—are only occupied for a portion of the twenty-four hours of the day, so that the conditions are more those of an ordinary dwelling-house. Windows can be freely opened when the rooms are unoccupied, and with suitable means for warming and ventilation each individual may suit his or her constitutional requirements and fancies. Mention has been made of the possibility of dirt accumulating in the air flues. This, however, must be guarded against. I know there are cases in which plenum ventilation has been adopted without proper provision being made for cleansing the flues and ducts, and may be other cases where sufficient care is not exercised in maintaining them clean, but these conditions constitute no argument for condemning the system any more than it would be reasonable to blame an architect because a room floor does not remain clean without periodical cleansing. An important point involved in the Belfast Hospital design is the lighting of the wards; placed as they are close together, side lighting is out of the question, and I consider the idea that the patients will miss the look-out as purely sentimental. The wards are comparatively short, and from every bed there will be a cheerful view out of the end window, and by means of the lanterns, which are not "sky-lights," as generally understood, a well diffused light will be secured throughout the wards. Questions have been put as to the cost of the plenum system of ventilation. This can only be looked at relatively, because it is difficult to estimate accurately what saving may be effected and what additional cost may be involved in the construction of the building; but, after careful consideration, I arrived at the conclusion that in a building costing about £130,000 the additional outlay did not exceed two to three thousand pounds. Then, as to maintenance, when due allowance is made for the wear and tear of transporting coal about a building, repair of grates, sweeping flues, &c., and all the accompanying noise, dirt and trouble, I think the plenum will compare favourably with any other system, even without taking account of greater efficiency.

"*Notes on the Construction of Cottages for Agricultural Labourers*," *by* GEORGE H. SMITH, P.A.S.I.

(MEMBER).

ABSTRACT.

THE great depression of prices and diminished incomes received by agricultural landowners of recent years has made the question of cost enter largely into the consideration of cottage building. A labourer earning a wage of 14 shillings per week, with a wife and family to maintain, cannot be expected to pay a rent sufficient to invite speculators to build for investment, and this being the case it would seem that £300 per pair of cottages, is about the highest amount that can usually be spent in building.

Every cottage should contain a parlour and kitchen, with small larder adjoining on the ground floor, and not less than three bedrooms upstairs. As a general rule the size of the parlour and kitchen should not be less than 150 ft. superficial, and for the bedrooms 100 ft. for one and 80 for the others should be the minimum. The height of the rooms on the ground floor should be 8 ft. 6 in., and upstairs 8 ft. is the minimum, but if the ceiling is coved they should not be less than 5 ft. at the lowest part, with 9 ft. for an area equal to one half the floor surface.

The front door should never open directly into the parlour, but into a lobby at the foot of the staircase, which tends to better ventilation upstairs.

The kitchen should have a strong open range in preference to a closed kitchener, on account of its being more cheerful when the room is used for sitting in. A small stoneware white glazed sink should be provided in a convenient corner, and it is very desirable to fit up a strong enamelled iron bath near the fireplace, with a deal hinged top to form a seat when the bath is not in use. The hot water can easily be supplied from the range by means of a pail.

All bedrooms should have fireplaces to assist in the ventilation of the room, and should also have additional means of air-inlet and outlet, such as a plain bracket-box with an air brick and flue through the wall, and an outlet into a special flue in the chimney.

The external walls should never be less than 9 in. in thick-

ness, even if covered externally with rough cast or tile hanging, and on no account must the damp-proof course be omitted.

The ground-floor can be cheaply constructed with deal blocks 9 in. by 4 in.. and $2\frac{1}{2}$ in. or 3 in. thick, bedded in pitch and tar, and laid on a 6-in. bed of cement concrete. The upper floors, the author considers, may, with great advantage and less expense than usual, be formed of 3-in. deal decking, tongued and grooved, and caulked with tow, with the upper surface twice varnished, carried on timber beams about 4 ft. apart.

Partition walls should always be of brick in cement.

The roofs should be boarded and felted, as this greatly lessens the cost of repairs.

Party walls should never be carried through the roof, as it adds considerably to the cost, besides increasing the risk of rain entering.

The author finds that one of the most successful methods of dealing with the waste water is to treat it by sub-irrigation by a tile drain down the garden; the solid excreta being collected in a galvanised-iron waggon, with a capacity sufficient to require emptying only once a week.

The water supply can often be obtained by means of a tube well at much less cost than sinking an ordinary brick-steined well, and at the same time preventing any risk of contamination of the water supply.

In conclusion, the author would insist that only the best materials and workmanship should be used; although perhaps more costly at first, there is a considerable saving in the annual repairs afterwards.

Mr. W. Jackling (Maidstone) said there did not appear to be much criticism to offer on the paper, but cesspools should certainly be made water-tight whether they were in rural districts or not.

Mr. E. J. Elford (Portland) said if they put baths in workmen's houses, they were likely to be used for any other purpose than bathing. There should be an ample supply of water and movable baths. The air space would be more useful than a fixed bath in what would be the living room.

"*On the Drainage of Buildings possessing no Open Space*," *by* MAJOR LAMOROCK FLOWER, F.R.Met.Soc., Sanitary Engineer to the Lee Conservancy Board, &c., &c.

(FELLOW.)

The object of this paper is discussion on a problem which is frequently found in practice.

In early days, drainage and sanitary requirements seem to have been about the last things the designer of a building thought about; only very recently some unpleasant facts were noted in connection with an important building recently erected in the West End of London.

In this case all soil-pipes were put *inside* the building, in defiance of the London County Council by-laws, and the requirements of sanitary science.

It is scarcely possible to conceive a case where the building is so isolated as not to have an approach to it; there are however numerous examples, especially of business premises, which, save the frontage to the street, are totally enclosed, and have no open space, not even to vaults under the pavement.

The author suggests that it is quite possible to deal with a typical case, as follows:—

We must start by following modern sanitary axioms in the design—namely, no connection with the sewer or cesspool into which the sewage is discharged; an intercepting chamber and a disconnecting trap must be provided, and on the house side of the trap an inlet for fresh air must be put in; and this must be done without trespassing on the street: the drain must have a current of air passing throughout its entire length and out into the open through the soil-pipe, which must be carried up full bore in a right line and open some four feet above all windows, and the soil-pipe must not be inside the building: the discharge from bath, lavatory, sink, &c., must not enter the soil-pipe nor the drain save through and over a properly trapped gully open to the air; but there is no area nor yard available.

There must be also an inspection chamber at the head of the drain, and this must not be inside the building.

We should proceed as follows:—

1st. Carry up a shaft about eight feet square in rear, and taken out of the building—of course, fully open to the sky; in

the base of this shaft put proper trapped gullies, to receive the bath and other wastes and the rain water, and provide a proper inspection chamber. Arrange to place the w.c.'s on either of the three sides of the open shaft; fix the soil-pipe in convenient place, and carry it up straight, full bore, open at the top, the bottom connected direct with the drain. Where several w.c.'s are connected to the soil-pipe, each over the other, provide a proper anti-syphonage pipe, two inches in diameter.

Thus, by taking a shaft out of the building itself, we shall overcome the difficulty of possessing no open space, so far as the rear of our building is concerned. The w.c.'s, lavatories, bath-rooms, &c., can also have free ventilation. The staircase may also be so planned as to get light from the shaft, and provision be made to allow the free passage of air from the front.

It is not necessary to refer to other sanitary details, which naturally follow.

We now have to arrange matters in front. The intercepting chamber may be arranged in an air-tight closed vault, taken out of the basement open only to the street by a hinged grating opening inwards, the opening being large enough for the passage of a workman to examine the trap and drain. The height of the vault must depend upon the level of the ground floor. Three feet above the level of pavement would allow sufficient air, and the plan may be, like the rear shaft, eight feet square.

In this vault put in an ordinary fresh air inlet on the house side of the trap, as aforesaid. Thus, then, we have solved the difficulty of "no open space" in front.

The drain in this case perforce must pass under the house, and may be of iron properly jointed; and if of iron, it is quite possible to put in an iron soil pipe of proper weight and properly jointed, and efficient junctions of the w.c. apparatus can be cared for. Or the drain may be of six-inch glazed stoneware properly jointed, set in a bed of concrete, and surrounded by good Portland cement concrete.

Soil-pipes have also been set of stoneware pipes, but lead is to be preferred, in view of possible bad joints in stoneware.

Another way of draining a house "possessing no open space" is to carry up a shaft as hereinbefore described, on either of the flank walls of the building and taken out of it as before. In this case we should have only one inspection chamber, this must have an intercepting trap and other details as before mentioned. Access to the shaft may be by a door in the basement.

In this case the soil-pipe must pass into the chamber on the house side of the trap, and the only air inlet would be for the

soil-pipe, as the drain would pass direct to the sewer beyond the intercepting trap. All other conditions to remain the same as hereinbefore noted.

The author trusts that in discussion we may have further examples suggested.

He has not gone in for other than moderate ordinary types, and leaving other sanitary questions, such as lighting, ventilation, warming, &c., alone, has confined himself only to drainage under difficulties.

"*The Prospective and Retrospective Aspect of Combined House Drains*," *by* A. TAYLOR ALLEN, Town Surveyor, Portslade-by-Sea.

(ASSOCIATE.)

THE question as to whether a drain is a sewer, or a sewer a drain, is a mere legal bearing of the drainage question, but it very materially affects the subject of drains from a sanitary standpoint. The illogical lack of uniformity in the several definitions applicable are noticeable.

1st. By the Public Health Act, 1875, "drain" means "any drain of and used for the drainage of one building only," or "*premises within the same curtilage.*"

"Curtilage" is the word that proves the stumbling block in this Act, the Courts having almost unanimously decided that the term curtilage must be interpreted as belonging to one messuage only. Premises within the same curtilage must be considered as including only the *one* dwelling and its outbuildings, and until curtilage can be so interpreted as to apply to the boundary containing *more* than one house, this stumbling block will exist.

Again, it is the definition of this section of the Act that promotes the difficulty owners and builders meet with in complying with local by-laws which are based chiefly on this Act, and applies more particularly to provincial towns.

2nd. By the Public Health (Amendment) Act, 1890, "drain" means "a drain used for the drainage of two or more houses belonging to different owners."

Here appears somewhat of a contradiction to the definition of the 1875 Act.

This Act, under Sub-section 1, certainly offers ways and

means of contracting out of liabilities in respect of combined house-drains. The purposes of the section are proceeding under Sec. 41 of the 1875 Act, which can only be put into force upon *written* application of any person stating that a drain is a nuisance, or injurious to health (and not otherwise), and, apart from any nuisance, it is questionable if the liability of the Authority to keep such a drain in repair is affected by this enactment.

The absurdity of this Act lies in the fact that if a drain is used by two or more houses *belonging to the same owner* it is still considered to be a "sewer," but if one of the houses should be sold, or owned by a different owner, this transaction would convert it back to a drain.

If the wording of Sub-section 1 be revised, so that it read "where two or more houses belonging to (*the same* or) different owner, &c.," and provision made for the Authority to sanction combined drains, the present complications would cease to exist.

3rd. By the Metropolis Management Act, 1855, "drain" includes a drain for draining any group or block of houses by a combined system under the order of the Vestry or District Board, thus provision is made in this Act to prevent combined drains becoming sewers. It may be implied from this Act that if a builder or owner manages to construct a combined drain without the order of the Vestry it is no longer a drain, but a sewer; but if he first obtain the consent of the Vestry it is "only a drain."

In the matter of old drains this Act must give rise to difficulty being experienced in showing whether such consent has been previously obtained from the Vestry or not.

I have illustrated a group of six dwelling-houses at the end of a row which exists in my district, and as the main drainage scheme is now being carried out, these will shortly be under consideration for connection to the main sewer. With the exception of one house, if these houses are to be separately drained, and a separate connection into the main sewer insisted upon, *each* house must have a drain underneath and through it, rendering the houses liable to any danger which might result from settlement, or defects in the drain or sewer by the careless filling-in of the ground after the usual water test had been applied by the Inspector, and thus harm may result to the occupiers by escape of sewer gas. A first point in drainage law should be to keep all the drains outside the dwelling, and on this principle combined drains are best in existing property where no "*separate*" back passages are provided.

In my system *each* house is safeguarded in being entirely disconnected from the conduit, or back line of drainage,

by an intercepting trap, a separate chamber, placed in the boundary of its own property, and provided for the purposes of examination, access, cleansing, and flushing. Free ventilation is provided through the drain, and thus each house possesses an entire system of its own, and within the boundary of its own property.

The intercepting trap could be built in a small manhole on the boundary of each house, giving the surveyor an opportunity, in case of blockage, of ascertaining on whose premises it exists.

The conduit, or back line of drainage, could be provided by an air inlet in the manhole, and outlet at the extreme end, and if laid to regular and even fall, one can hardly imagine this drain getting out of order.

I have also illustrated a group of seven dwelling houses in the middle of a row existing in my district, where it is impossible to drain without one of the houses having a drain passing through and underneath it, and in this exceptional case great care should be exercised in laying the same, iron pipes with leaded joints being used, as in this only *two* joints would be needed under the house, and the same advantages would apply in this as in the last group just explained.

In a separate system for each house, the fact must not be lost sight of, that with a shallow sewer in the main road, and the complication of boarded floors, joists, sleeper and partition walls, a man must necessarily be handicapped in laying a satisfactory drain, and if one house only has the drain under it special care would be taken with the work, and possibly the house closed while the work was being done.

The question is, is one house only to have the odour from the connection, or *each* house, as it must be borne in mind that in the case of existing property the connection would cause a certain amount of unpleasant work.

Summary.

1st. Three definitions of "drain," and the illogical lack of uniformity in the three Acts.

2nd. Suggested revisions to prevent present complication.

3rd. Suggested system for combined house drains by the author to *existing* property, where it is impossible to drain otherwise.

Mr. E. Clayton (Mansfield) observed that the question was always cropping up whether a drain was a drain, or was not a drain. It

was an extraordinary thing that such a long time should have been allowed to elapse without the various authorities coming to a thorough understanding, and thus bringing about an alteration in the wording of the Act.

The PRESIDENT OF THE SECTION (Alderman J. Lemon) said he could never see the difference between a sewer built in a street and a sewer at the back of the street. If a sewer were built by one or more private owners at the back of houses through a back way, it was done so that it should be under the inspection of the local authorities. When that was done, he did not see why they could not take it over as a public sewer. If that principle were enunciated they would know at once which was a sewer and which was a drain.

"*Ventilation of Sewers*," *by* D. S. DAVIES, M.D., M.O.H., Bristol.

(MEMBER.)

IT is very necessary, in considering the question of sewer ventilation, to disassociate this entirely from the question of house-drain ventilation. I may state at once that in my opinion every house drain should be cut off from the street sewer by an intercepting trap, and the soil pipe properly ventilated in full diameter above the roof, and all other conditions observed to render the admission of drain-air to the house impossible.

It is unnecessary to take up your time by insisting upon the danger of drain or sewer air admitted into enclosed places, or upon the undoubted possibility of resulting septicæmia, erysipelas, or enteric fever; nor need we discuss the method by which the causal organisms, with difficulty separable from moist surfaces, get carried, under conditions of intermittent use and partial drying of drain contents, or otherwise, by air currents into dwellings.

Beyond this, is it necessary to ventilate the public sewer, *i.e.*, to provide designed inlets and outlets so as to encourage air currents continuously and regularly throughout the sewer?

It is generally assumed that sewers must be ventilated,

apparently with no greater-reason than is to be found by following the analogy of house drains.

A properly-constructed sewer does not admit of much deposit, so that little chance of decomposition occurs; but all sewers get fouled and the sides slimy, and are thus capable of smelling offensively under certain conditions of flow and temperature. Considerable smell from an open sewer need not indicate the evolution of volumes of gas, or a great increase of pressure.

As Dr. Francis Clark, of Lowestoft, has put it, "It is better to bottle a smell than to dilute and so 'purify' it by spoiling a large bulk of pure air, and there are better ways of dealing with sewage emanations than that of forcing them down the throat of the 'man in the street' by mixing them with the atmosphere we breathe."

I fully agree, too, with Dr. Clark's suggestions that the foul odours which emanate from open street grids must be confined to their proper place, the sewer. I agree with him also that in any form of sewer, provided the houses are properly disconnected, little or no ventilation is required, and fresh air inlets are a serious mistake; for the more fresh air you suck or pump into your sewers, the more fouled air will there be emanating at other points, and contaminating the atmosphere, without in any way benefiting the sewer or its tributaries.

If any shafts at all are required, an occasional upcast here and there would suffice to equalize pressure caused by unequal flow, admission of storm water, &c.; but even these appear to be superfluous, for should the sewer air pressure increase so as to pass the water seal of the intercepting trap, it finds immediate vent up the open soil pipe ventilator, and cannot enter the house. And where the street gullies admit storm water to the sewers, as in Bristol, a further safety valve through the water seal of these gullies is afforded, with this advantage, that the escaping air is washed as it bubbles through, and causes no offence on its escape into the street air.

The only time, indeed, when in Bristol we get smells or complaints from the sewers is after prolonged drought, when the gullies dry, and our system approximates to that of a ventilated town; this is easily set right by sending a water-cart round to fill up the gullies.

Secondly,—Is there medical evidence of the need for ventilation?

In Bristol the sewers are totally unventilated; and as they have been so since they were constructed, it is a point of great importance to ascertain the ill effect, if any, upon the public health. For this purpose I prepared for the use of the Bristol Council an analysis of the Registrar-General's ten years'

returns relating to Bristol and certain other towns noted as generally healthy:—

Statistical evidence that there is no excess of mortality of fever or other illness which might be attributed to sewer influence, in Bristol as a whole, or in Clifton as a district of Bristol.

From the Registrar-General's Annual Summary (1897). Death rates for the 10 years, 1887-96.

	All Causes per 1000 persons living.	Infant Mortality per 1000 births.	Per 100,000 living.		
			Fever.	Diphtheria	Diarrhœa.
Thirty-three Great Towns	20·6	167	20	29	84
London..............................	19·9	155	15	45	67
Bristol (including Clifton)	18·9	146	11	13	49
Brighton	17·7	149	11	18	66
Croydon	14·5	126	11	32	46
Clifton* (from local returns) ...	13·8	115	8	6	21

Here are the death rates from all causes, the infant mortality (per 1,000 births), and the death rates from fever, diphtheria and diarrhœa, which may reasonably be looked to as indicative of good or bad sanitary condition. Ten years is a reasonably long period, enough to equalise results, and prevent accidental error.

Croydon is chosen for comparison, because it has the lowest general death rate of the 33 great towns, is with good reason proud of its healthiness, and is a "ventilated" town; so is London, and so are most, if not all, of the 33 towns. Brighton is included for similar reasons.

As to general death rate, that for Bristol, while below the rate for London and the 33 towns, is higher than that for Croydon and for Brighton; but the Clifton rate is below that for Croydon, and considerably below that for Brighton.

As to Fever.—The rate for Bristol (unventilated) is exactly equal to the rate for Croydon (ventilated), and is also exactly equal to that for Brighton (ventilated). So far as the important question of fever mortality is concerned, then, towns using exactly opposite systems as to sewer ventilation, are upon an equality. The rate for Clifton (unventilated) is considerably below the rate for Croydon, and equally below the rate for Brighton.

* Clifton is a registration sub-district of the City of Bristol, and contains (1898) a population of 46,800 persons.

The fever rates for Bristol and Clifton are both markedly below the rate for London, and for the thirty-three towns.

As Bristol is an old, densely populated and closely built city, the fever rate might be supposed to be in excess in comparison with Croydon, especially if unventilated sewers had any ill effect, but it is equal to it, and that for Clifton is much lower.

As to Diphtheria.—The rate for Croydon (ventilated) is more than double the rate for Bristol (unventilated): and more than five times the rate for Clifton (unventilated). The rate for the thirty-three great towns is more than double the rate for Bristol, and the London rate is more than three times as large as that for Bristol. The rate for Clifton is less than half the Bristol rate, less than a quarter the rate of the thirty-three towns, and is less than one seventh of the London rate. Brighton shows a Diphtheria rate higher than that for Bristol, and three times as high as the rate for Clifton. (Clifton forms part of Bristol).

Some increase in Diphtheria mortality has of late years been observed in Bristol, as in other large towns, but in far less degree. It is obvious that, if the increase of Diphtheria in Bristol is to be attributed to the unventilated condition of the sewers, the far greater increase in other towns may with equal reason be ascribed to the ventilated condition of their sewers, the healthiest of these towns show Diphtheria mortality rates which are from three to five times as high as that for Clifton.

As to Fatal Diarrhœa.—The rate in Bristol is 49 (per 100,000), as compared with Croydon's 46, with Brighton's 66, with London's 67, and with the 33 Towns' 84. The Croydon rate, 46, is more than double that for Clifton, which is only 21.

Infant Mortality.—That for Croydon, 126, is very favourable; but Clifton is considerably lower, 115. The Bristol rate, 146, is the next lowest of the 33 Great Towns, which collectively show a rate of 167, and is below Brighton, which is 149, and London which is 155.

These figures for 10 years show that old Bristol need not fear comparison with a new town (Croydon), somewhat remarkable for healthiness; or with other great towns generally, or with London.

Clifton (including a populous working-class district in the Hotwells) stands far above these towns for general health, and especially for its freedom from fever, diphtheria, and diarrhœa.

Mr. R. READ (Gloucester) said that Dr. Davies started boldly by pinning his faith to the intercepting trap as a safeguard between the sewer and the house. This foul abomination was invented by the late Mr. Buchan in a time of panic, soon after the illness of the Prince of Wales in 1872, and was almost jumped at by the medical profession and the public as an ideal way of preserving the household from the effects of sewer-gas; and the Local Government Board adopted it in their model by-laws issued in 1877. This trap is not a safeguard to a house, but merely an obstruction; the real safeguard is the soundness of the drain and its joints. The trap is placed in the flattest portion of the drain, causing an obstruction eight inches deep, and containing something like three gallons of foul sewage; and although Dr. Davies and other medical officers insist on the insertion of this foul obstruction, they or their inspectors would at once condemn the other portion of the drain if one pipe only had a back-fall—that is, a fall in the wrong direction—of only half-an-inch; and any man who knows the effect of even such a slight back-fall as this can imagine the serious obstruction caused by the intercepting trap. Dr. Davies approved of the ventilation of house drains, but not of the public sewers; he quoted Dr. Clark, and said that "the ventilation of sewers must mean the letting out of foul gas." It meant nothing of the kind, provided the ventilation was properly located, proportioned, and distributed, and the sewers self-cleansing. A foul sewer could only be partly remedied by ventilation, the real remedy in that case being reconstruction and flushing, combined with proper ventilation. Dr. Davies said that the Bristol sewers were not ventilated at all, a statement which has been repeated many times during the last twenty years; but this simply meant that there had been no official attempt to ventilate them, but they nevertheless ventilated themselves; because Bristol is an old city, and there must be a great number of drains that have no intercepting traps upon them; and in all such cases the rain-water pipes and the soil-pipes would act as ventilators to the sewers as well as the drains; and this made Dr. Davies' comparison between Bristol and Croydon misleading, even if other local circumstances affecting the death-rate, etc., did not do so; and it must be remembered that the sewers in Bristol are exceedingly good sewers, well laid and with good gradients, and have an enormous amount of flushing.

Dr. R. SYDNEY MARSDEN (Birkenhead) said that this subject was one of the most important exercising the minds of municipal authorities at the present time. What was the fact they had to consider? As Sanitarians they had for years directed the whole of their efforts in this connection to exclude sewer gas from their houses. That was a recognition that sewer gas was injurious, and they had taken every precaution to prevent people from inhaling it. The question then arose: Were they any better off in keeping it out of the houses if they threw large volumes of it up in the public streets in front of house windows, and allowed people to take whiffs of it every forty yards as they walked along the streets? The question was an impor-

tant and a serious one, and wanted very careful consideration. He was not in a position to advocate one system or another, and he had come there to learn. But he thought the remarks of Dr. Newsholme, although true and valuable in themselves, were very misleading as to the issue at present before them, and in his opinion were not quite relevant to the question of open sewer grids on the surface of the roads. He, therefore, objected to this "red-herring" being drawn across the track. It was not so much a question whether Dr. Davies proved that they had less of certain diseases in Bristol than in other towns, as whether they were going to continue to breathe sewer gas every few yards along the streets or not. There was a great deal of uneasiness caused in the public mind of our large towns by the smells that came from the sewers, as it was thought that these were an important factor in the spread of disease, and Dr. Davies had shown that in Bristol the sewers were kept closed up without detriment to public health. If this can be done in Bristol, then why can it not be done in other towns? *That is the real issue.* And the question has not been satisfactorily answered. Surveyors nearly all cry for ventilation grids, and say that medical officers do not understand the question. But they have never answered Dr. Davies's argument, based as it is on practical experience. They were told by Mr. Read that the sewers at Bristol were ventilated in an indirect way. But that does not matter. The question was did they require to have these ventilators in the centre of the road? He held an absolutely neutral position in the matter, but his feeling was that if Bristol could do without surface ventilating grids, if Bath could do without them, if Leicester was beginning to do without them, other towns could do without them also, and in that case it would be a great relief to the public mind. It was said that Dr. Davies had no right to compare Clifton with another borough like Croydon. But Dr. Davies's object in comparing the statistics of Clifton with those of other places was a different one. They must know that Clifton stood very high, and the general idea was that sewer gas went up the sewers to the higher regions of the town. He did not think it was so, but that was why Dr. Davies quoted Clifton on account of its high level. And he showed that with no surface grids Clifton did not suffer, but had a clean bill of health. He thought that was a fair inference, and he had not heard anything to contradict it. Bristol was an instructive town in many ways, and a very suitable town in which to discuss this subject. The town from which he came, Birkenhead, was very similar. A large part of it lay low and the sewers were tide-locked at high-water, and the higher part was within forty feet as high as Clifton. They, in Birkenhead, thoroughly ventilated the sewers by grids opening at the level of the roads about every forty yards, and in the result, as regards the diseases quoted by Dr. Davies, they did not compare favourably with Bristol. His Corporation were going to look into this matter with an unbiassed mind. They would make a thorough enquiry throughout the country and get to know, if possible, whether it was not possible to effect an improvement in regard to this subject and get rid of the gratings now

placed in the middle of the road, and, at the same time, rid themselves of a horrid nuisance. He thanked Dr. Davies for his paper, and considered that up to the present time his argument had not been effectively answered.

Dr. HAROLD SCURFIELD (Sunderland) said he was extremely interested in the subject of sewer ventilation. Medical Officers of Health who lived in towns where they had the system of ventilation by street gratings knew how frequent were the complaints from this source. Some people deemed it absolutely necessary to have the sewers ventilated. He held the opinion that, though it might be necessary to have vent-openings simply for the purpose of relieving pressure, it was not necessary in the least to have fresh air introduced into the sewers. He saw no reason for changing the air of sewers frequently, as they tried to do in the case of a habitable room. He thought they could rely on the traps of house drains and good plumbing work to stop sewer-gas getting into houses. He did not think that sewers were often under appreciable pressure from the development of gas. Wind blowing in at one opening caused sewer-air to blow out at another opening, and such currents of sewer-air had nothing to do with pressure caused by gas formation. Dr. Davies instanced the Bristol sewers as an example of non-ventilation. They were tide-locked a good part of the day, and had no shafts near the outfall to relieve pressure. If there was a thunderstorm during the time when the sewers were tide-locked, the sewer-air probably got out by forcing the seals of the street catch-pits, and no harm had been found to result in Bristol from the combined efforts of storms and tide-locked sewers. If the Bristol sewers were ventilated on an unconscious system, as had been suggested by one speaker, it became a question whether other towns should not adopt the unconscious system in preference to ventilation by street-level openings. He thought the Bristol experience went to prove that the notion that sewers were frequently under a pressure of sewer-gas was a mistaken one.

Mr. ARTHUR SMITH (Lowestoft) said that, as one who had received his training at Bristol, he could say that the sewers were not ventilated, but the facts were as stated by Dr. Davies. He thought that there might be a few cases where no intercepting traps had been put in. He knew that for years all the old drains that were found not so done were properly trapped, and all new drains were intercepted. There were no ventilation gratings and no sewer-shafts at Bristol, and yet it compared favourably with other towns. Clifton had been mentioned as a high-class part. That was so in regard to some part of it, but it also included some of the worst slums in Bristol.

Mr. R. A. MACBRAIR (Lincoln) said that some twenty years ago when they began at Lincoln to connect the houses with the main sewers the Corporation decided not to insist upon the disconnecting

traps provided in the Model Building By-laws. Therefore, some 90 per cent. or 95 per cent. of our houses do not possess these traps, consequently nearly all the public sewers are ventilated through private drains. His experience seemed different from that of other towns. They had erected some 150 or 200 ventilating pipes, varying from 4 in. to 9 in. in size, on private property, and he had not received ten refusals to fix these pipes. At the bottom they put large rust chambers. He did not close up any of the manhole grids in the streets until he received several complaints that they were a nuisance; this closing took place on the erection of the above-mentioned ventilating pipes on private property.

Mr. Moss Flower (Bristol) said that Clifton was one of the most beautiful spots in the Kingdom, and that it was altogether unfair to say that in Clifton there were worse slums than could be found in any part of the country, as a previous speaker had done. It was true that in the Hotwells part of the district, near the floating harbour, there were some areas somewhat overcrowded, and the general sanitary condition of which could be improved, but this district was on a much lower plane, in fact hundreds of feet below Clifton proper, and one might say it really had nothing to do with it. In the residential part of Clifton the houses were well kept, and, as a rule, they would find that the sanitation of the place would compare favourably with that in any part of the Kingdom. He had had considerable experience in Clifton, and had, on many occasions, been called in to make examinations in connection with the drainage of houses in which there had been cases of infectious disease, and he was bound to say that in each case he had found defects in the sanitary arrangements which allowed sewer gas to enter the house, and in one case a whole family suffered from blood poisoning. It had been said that the amount of pressure exerted by the sewer gas within the sewers and drains was very little, and might be altogether ignored. He, however, did not believe in this theory, as from his experience in Bristol, where it was well known the sewers were designedly not ventilated, he had found the sewer gas, in some instances, exerting a considerable pressure, and in one case sufficient to blow away a piece of paper held over the drain. With regard to the low death-rate, it was much to the credit of Dr. Davies and those who looked after the public health that it should be as low as it was; besides, they were so fortunately placed that the physical conditions help them considerably in this matter. The death-rate compared favourably with other towns. The question was, could it not be made more favourable by the adoption of some effective means of ventilation? Some parts of Bristol had a very old system of sewers and drains. Some of them were, no doubt, very flat—elongated cesspools, or septic tanks, if they liked to call them so. In many instances there were no disconnecting traps, nor any ventilation to the drains. Any man who knew anything about sewers and drains would say that that was not a proper state of things, and he maintained that in many instances it would be considered intolerable.

It was no use to ventilate the defective sewers. In such cases, the sewer would have to be reconstructed in the first instance. With the reconstruction of the defective sewers, and a proper system of ventilation, he maintained there would not be an increase in zymotic diseases, but a general improvement in the health of the inhabitants, and a possible lowering of the death-rate.

Mr. E. G. MAWBEY (Leicester) said the experiments they had carried out in Leicester proved to him that they could ventilate the sewers without opening gratings in the street, and without creating any nuisance. It was very gratifying to hear medical officers say one after another that they supported the closing of the grids, but that they must ventilate in some way. As engineers, they were emphatic that it was necessary to ventilate, and they had successfully met the difficulty by adopting a system of ventilating shafts to discharge the foul air above the house-tops. He described some experiments that had been carried out at Leicester, and said he was gratified to hear medical officers ready to support engineers who were bold enough to recommend the closing of gratings. The only doubt on the point was the probable effect on the public health. If the medical men said there was less danger to health with shafts, and would support the engineers in this matter, they would be grateful to them.

The PRESIDENT OF THE SECTION (Alderman J. Lemon), said it would seem that there was no town in England without some form of ventilation. As an engineer, he said that ventilation was necessary; but they should not do it in any chance way, but on sound scientific principles. They must provide for some kind of inlet and exit. He had lately been consulted by a local authority in regard to a question of new drainage, and he had recommended them to abandon gratings and put in up-and-down shafts. In Southampton they had few gratings, but they had the necessary ventilation in other ways; and the sewers of every town must be ventilated in some form or other.

"*The Provision for Storm Water in Sewage Purification Works,*" *by* A. J. MARTIN, Assoc.M.Inst.C.E.

(MEMBER.)

THE difficulty of dealing with a matter of sewage disposal is nearly always aggravated by the large volumes of rain water which find their way into the sewers. It might, therefore, seem desirable that surface water should be kept out altogether;

but it is now recognised that it is practically impossible to exclude all rain water from any system of sewers. Even where road water is excluded, the drainings from back yards and back slopes of roofs are generally admitted to the sewers, both on account of the expense of constructing a duplicate system of sewers and because of the serious objections to the existence of two sets of drains on private property. If the whole of the water so admitted had to be dealt with in the purification works, the size and cost of these would in most cases be greatly increased.

In early works of sewage disposal, therefore, it was customary to provide for dealing with the dry weather sewage alone, and to discharge the excess flow during wet weather without any purification whatever. This practice derives some sanction from the conclusions arrived at by the Rivers Pollution Commissioners appointed in 1868, and submitted in their third report as follows:—

"There is in the case of town sewage a condition of things which ought, in our humble opinion, to be taken into careful consideration in the framing of a legislative enactment. The condition to which we allude is that caused by excessive rainfall, or 'storm water,' as it is technically called. To provide for the exceptional occasions when this condition prevails would entail in many cases an expenditure in sewage works many times greater than that necessary in ordinary weather. We are, therefore, of opinion that, however undesirable, it will be necessary to permit storm water to flow directly into rivers and streams without preliminary cleansing." The Commissioners, however, go on to say:—

"Unfortunately, chemical analysis shows that storm water, so far at least as its earlier portions are concerned, is more polluting than dry weather sewage, owing to old deposits in the sewers being then swept to the outfall; and it will be very important therefore to guard against any unnecessary use of this exceptional permission."

The views herein expressed form the basis of modern practice in sewage disposal; and most works of recent construction provide for dealing with a certain amount of surface water in addition to the sewage proper. It is often, however, practically impossible to provide works capable of dealing with the whole of the surface water which reaches the sewers after heavy rain. It therefore becomes necessary to decide how much of the diluted sewage shall be dealt with in the ordinary works and how much shall be discharged untreated. This question was brought before the Leeds Congress of the Institute in an able paper by Mr. E. J. Silcock; but owing to the severe pressure

upon the time of the section before which it was read, the paper did not attract the attention which it deserved.

The subject has again been brought prominently to the front by the recent adoption by the English Local Government Board of rules governing the amount of storm water to be provided for in works paid for by means of loans.

The decision how much storm-water works shall be called upon to deal with is one presenting great difficulty, owing to the number of considerations involved. The matter may be approached from at least three different points of view:

(*a*) The extent to which sewage shall be diluted before a storm overflow takes place.

(*b*) The frequency with which a storm overflow may take place.

(*c*) The relation between the volume of the sewage and that of the stream receiving the storm overflow.

It is hardly necessary to point out that a rigid adherence to any of these bases without regard to all the circumstances of the case will produce exceedingly anomalous results.

(*a*) The first basis is probably the weakest in principle; but it possesses the important practical merit of being the most easily applied, and has accordingly been adopted by the Local Government Board in the rules which they have recently laid down. These may be briefly stated as follows:—

"As at present advised, the Board consider that whatever system is adopted as a means for dealing with the sewage, it is necessary that provision should be made in the scheme for (1) Treating fully as ordinary sewage a volume of mixed sewage and storm water equal to three times the daily dry weather flow of sewage, and (2) Dealing with the excess of storm water up to six times the dry weather flow, or a balance of three times the dry weather flow, either by passing it through a special and separate storm filter of sufficient extent, or by delivering it on a special area of prepared land other than that in use for the treatment of the effluent from the ordinary tanks and filters." . . . "If a special storm filter is provided for this purpose, it should be of sufficient extent to allow a rate of filtration of 500 gallons per square yard per diem."

In applying these rules, we are brought face to face with the wide differences which exist in the volume of the dry weather sewage per head of population in different towns. These are due to various causes, for instance, greater or less lavishness in the use of water for domestic purposes, water used for trade purposes, waste of water, the admission of brook water, and the infiltration of subsoil water into the sewers. If the

dry weather flow is regarded as including the extraneous water which finds its way into the sewers, the quantity to be dealt with in the works will be correspondingly increased, and we shall have the anomalous result that the diluted sewage which one public body may discharge without treatment, will be considerably stronger than that which another authority will be called upon to purify.

The anomaly will be reduced if extraneous water is ignored, and the actual water supply taken as the basis on which the size of the works is computed; but we are still met with the wide discrepancies which exist between the quantity of water supplied in different towns. It would therefore seem reasonable that a certain number of gallons per head should be laid down as the quantity to be dealt with in all cases; or perhaps better still, that a sliding scale should be established, based upon the average rateable value of the houses draining to the works. Any waste water from factories would have to be added to the sewage proper.

(b) A consideration at least equal in importance to the extent of dilution at the time of overflow is the frequency with which such overflow takes place. The sewage of some towns is permanently diluted with subsoil water to such an extent that it might be discharged without any treatment if the amount of dilution were the only consideration. In other cases the area draining to the sewers is so great that the overflow weirs will be brought into use by a rainfall of a few hundredths of an inch, and consequently when the streams receiving the overflows are not swollen appreciably above their dry weather volume. In such a case as this a high degree of dilution of any storm discharge is certainly desirable. By way of contrast, a case may be taken where no surface water other than that from back yards and the back slopes of roofs finds its way into the sewers. One thousand houses may conveniently be taken as the unit. The dry weather sewage from one thousand houses, at five people per house, and twenty gallons per head per day, would amount to one hundred thousand gallons per day. Taking the surfaces draining to the sewers as averaging six hundred square feet per house, we have a total area of six hundred thousand square feet. Each one hundredth of an inch over this area equals five hundred cubic feet. The amount of diluting water which the Local Government Board require to be dealt with before a storm overflow comes into operation would be five times the dry weather flow, or five hundred thousand gallons, equal to eighty thousand cubic feet per day. This quantity represents a rainfall at the rate of 1·60 inches per twenty-four hours, or a still larger fall when loss by absorption

and evaporation is taken into account. It would clearly be a hardship that a town which only uses its storm overflow when this rate of rainfall is exceeded, and when consequently the streams are swollen, should be called upon to dilute its sewage to the same extent before using its overflow weir, as another town in which an overflow takes place after a rainfall of a few hundredths of an inch.

(*c*) The important point after all is not the rate of dilution of the storm water as it leaves the sewers, but the resulting dilution in the stream into which it is discharged. The volume of the stream is therefore a factor of prime importance in dealing with this question.

While emphasizing the need for paying attention to the frequency of operation of a storm overflow and the resulting dilution in the stream, rather than the amount of dilution at the moment of discharge, we are bound to recognise the fact that a given dilution of the storm water in the sewer can be provided for with some degree of certainty, while it would be difficult to regulate the frequency with which such overflow takes place, or the degree of dilution which shall ensue in the stream receiving it. It would, therefore, be impossible to make either of these last named factors the basis of a definite rule; but they should nevertheless be borne in mind in dealing with any particular case.

Having determined the amount of storm water with which works shall be capable of dealing, the next question which arises is the manner in which the storm overflow shall be brought into action. The Local Government Board insist that fixed weirs shall be used, which will only come into operation when the sewage has been diluted with five times its volume of storm water, that is to say, when a certain rate of flow in the sewer is reached. The advantages of a fixed weir as compared with a movable one are obvious; but there are grave objections to any overflow which depends upon the rate of flow in the sewer at any moment. Such an overflow will necessarily come into operation before the flow to the works reaches the maximum with which they are laid down to deal. This point will be best explained by means of a concrete example. A 24 in. sewer at a gradient of one in four hundred will deliver a maximum quantity of 792 cubic feet per minute, when filled to a depth of 22½ ins. An overflow weir 4 ft. long, having its crest at two-thirds the height of the sewer, will reduce the depth of flow in the latter to about 18¾ ins., giving about 2¾ ins. on the crest of the weir. The latter will carry off some 90 cubic feet per minute, leaving 702 cubic feet per minute to flow down the sewer to the works, which must therefore be capable of

dealing with this quantity. The storm overflow will, however, begin to take place long before this rate is attained, viz.: when the surface of the sewage reaches the crest of the overflow weir. The flow to the works will then be at the rate of 577 cubic feet per minute, or just over four-fifths of what they are capable of dealing with. The degree of dilution will be still further reduced if the storm overflow takes place when the volume of sewage proper is greatest. In large towns the maximum dry weather flow will generally not exceed twice the average, but in smaller communities the proportion will be two and a half times, or even more. The amount of dilution secured by a fixed weir is therefore variable, and will at times be considerably less than the works are intended to secure.

The Rivers Pollution Commissioners, in their report already quoted, point out that the earlier portions of storm water are more polluting than dry-weather sewage. The polluting matter is derived partly from the surfaces draining to the sewers, and partly from old deposits in the sewers themselves. The greater and more sudden the rush of storm water, the larger will be the proportion of polluting matter which it sweeps through the storm overflow. The protection afforded to a water-course by the enforcement of a certain degree of dilution is thus inconsiderable. It is therefore exceedingly desirable that the whole of the storm-flow should be dealt with in the purification works—so far, at least, as its earlier stages are concerned. In works of sewage purification which he is called upon to design the author accordingly prefers to treat the whole flow of the outfall sewer, so long as it contains the first scourings from the sewers and surfaces drained.

The means by which this is accomplished will be best explained by describing the arrangement adopted in an installation which was recently designed by the firm of which he is a member, and laid down under the superintendence of Mr. Wardlaw, C.E., of Glasgow, to deal with the sewage of Barrhead. These works are intended to serve 10,000 people, and to deal with a maximum flow of 400,000 gallons per day. If the dry-weather flow is taken at 20 gallons per head, or 200,000 gallons per day, the ratio of maximum to ordinary flow will be two to one, or two-thirds of what is now enforced in England. The author submits, however, that by reason of the means adopted for dealing with the first rush of storm water, these works afford a more efficient safeguard against the pollution of the river than if the provision had been 50 per cent. greater, and the storm overflow made to depend directly upon the rate of flow in the sewer. The overflow weir is placed in the grit chambers, and extends the whole length of

the dividing wall between them. Its crest is 18 inches above the ordinary working level of the sewage in the septic tanks. No overflow can take place until the intermediate space, amounting to 10,800 cubic feet, has been filled up. The tanks are therefore capable of receiving for some considerable time the whole flow of the sewer, however great it may be. The actual time varies, roughly speaking, inversely with the rate of flow. Thus a flow at the rate of 3,600,000 gallons per day, or eighteen times the assumed dry weather flow, will be dealt with by the works during the first half-hour; with 2,000,000 gallons per day, or ten times the dry weather flow, the time will be one hour; with 1,200,000 gallons per day, or six times the dry weather flow, two hours; and so on. In each case the coming into action of the storm overflow will be deferred for the period mentioned; and if the storm flow should be of short duration, as in the case of a thunder-shower, no overflow whatever will take place. The regulation of the flow through the works is effected at the outlet from the tanks, and is therefore not liable to be interfered with by solid matter, as would be the case with any regulating arrangement at the inlet thereto. The regulators at Barrhead consist of a couple of modules; but in other cases the alternating gear which actuates the valves of the filters may be so arranged as to control the quantity of sewage passing through the works.

In order that the provision for dealing with storm water may exist in reality, and not merely on paper, the purification works should be capable of quickening their pace so as to deal with the maximum quantity for which they are designed, however suddenly it may reach them; or a man should be constantly in attendance to bring this about. Unless proper provision is made to receive storm water at any time, whether expected or not, it is little better than waste of money to provide works for dealing with it. The working of the installation already referred to, as well as that of others on the same system elsewhere, conforms itself immediately and automatically to the rate of flow at any time.

An overflow weir should always be masked by a scum slab, so that floating solids may not escape thereby, but may pass on to be dealt with in the purification works.

If the Local Government Board's requirement, that works of sewage disposal should be capable of dealing with three times the dry weather flow, necessitated a corresponding increase in the size of the works, the expenditure involved would cast a heavy burden upon the ratepayers. Fortunately, however, this is not the case. Purification works on the biological principle, and to a certain extent doubtless those

on other systems, are capable of dealing temporarily with volumes of dilute sewage far exceeding the quantities of ordinary sewage which can be safely passed through them continuously. A good deal of misapprehension prevails on this point. It has been assumed that a septic tank in particular is liable to be thrown out of gear by storm water passing through it, and pathetic pictures have been conjured up of hapless microbes torn from their moorings by a torrent of storm water passing through the tank. These apprehensions become ridiculous as soon as the facts of the case are examined. The velocity of flow in the tanks at Barrhead, for instance, with three times the volume of the dry weather sewage passing through them, as required by the English Board, would be $1\frac{7}{8}$ inches per minute. With six times the dry weather flow passing through the tanks, the velocity would not exceed $3\frac{3}{4}$ inches per minute, which is utterly powerless to disturb the solid matter therein. In all cases where the outfall sewer is not excessively large for the work it has to do, it is safe to say that it might discharge full bore into the tanks without any deleterious effect upon them. The influence of an occasional storm flow is, indeed, beneficial rather than harmful, inasmuch as it carries away with it the products of the action of the bacteria both in the tanks and filters, thus stimulating their activity to a corresponding extent.

The principal conclusions which have been arrived at in the foregoing paper may be briefly stated as follows :—

1. That no definite rule as to the proportion of storm water to be dealt with can be applicable in all cases.

2. That the first scourings of the sewers and surfaces drained should pass into the ordinary works before any overflow is allowed to take place.

3. That the works provided for dealing with storm water should always be ready to receive it at any hour of the day or night.

4. That reasonable provision may be made for dealing with storm water without adding unduly to the cost of works.

Mr. G. Thudichum (London) said the question of storm water was of particular importance, and they must thank Mr. Martin for the able way in which he had dealt with it. It appeared to him that the suggested method was an admirable way of dealing with the difficulty in a good many cases. He thought Mr. Martin had not laid sufficient stress on one point, and that was the utter inadequacy

of the present method of storm overflow treatment. The Local Government Board said that sewage should be diluted to a certain extent before it should be allowed to escape. The first rush of storm water was often more polluted than ordinary sewage itself, and they could hardly say they were diluting with added bulk when the added bulk was more polluted than that which it was supposed to dilute. He had had experience of this during his connection with the Metropolitan Board of Works, and had had samples taken during the rush, and submitted them to analysis. There could be no doubt at all that what was going into the river Lea at that time was stronger than sewage that was carefully conveyed to the works. The ordinary overflow arrangements were absolutely useless as a means of preventing the pollution of the stream, and were only useful in preventing more water arriving at the works than the works could deal with. There should not, however, be any arbitrary standard laid down to be followed generally and blindly. Take the sewage of London itself; the ordinary normal flow was 200,000,000 gallons a day, it was a river twenty feet wide and four feet deep, flowing steadily at the rate of four miles an hour. Could it be suggested that London should be called upon to provide works to deal with six such rivers under any conditions whatever? It was impossible to deal with a summer shower in that way in any very large city. For smaller cities and towns and villages this system of Mr. Martin's exactly meets the case, and he deserved their thanks for placing before them so good solution of a very troublesome question.

The PRESIDENT (Alderman J. Lemon) said the excellency of the paper was an indication of the thorough way in which Mr. Martin carried out anything he took in hand.

"*Sewage Purification without Filtration*," by W. KAYE PARRY, M.A., A.M.Inst.C.E.

(FELLOW).

NINE years ago Dr. Adeney claimed that sewage could be purified by developing the micro-organisms contained in the liquid itself, and he asserted that this could be accomplished by the addition of small quantities of oxygen-carrying chemicals to the sewage.

Prior to that time no chemist had put forward such a method as practicable. It is true that Dr. Dupré had suggested that the solution of the sewage problem might be found by the

preparation of a special culture to be added to the sewage, but the utilization and development of the organisms in the liquid itself as the direct agents of purification was an absolute novelty.

Others had, indeed, shown that the beneficial effect of land treatment was due to biological action, but that this same result could be obtained in the body of the liquid without land and without filters of any kind was a new departure.

In these days we have become familiar with the action of bacteria, and everyone knows that given suitable conditions they are the best, nay, the only agencies upon which we can rely for the reduction and oxydation of organic matter.

Nine years ago, men spoke learnedly about "occluded oxygen" as the active agent in certain filtering materials, and the direct oxidizing action of atmospheric oxygen was looked upon as the active principle in the breaking down of the organic matter.

From the very outset of his work, Dr. Adeney expressed the opinion that the results were accomplished not by the direct action of atmospheric oxygen, but by the organisms, whose activity was promoted by a sufficient supply of oxygen, and he stated that it would be more economical to supply them with oxygen by means of a suitable chemical compound than to endeavour to utilise atmospheric oxygen itself.

He was also led to believe as a matter of economy it would be cheaper to separate the insoluble organic matter in the first instance by means of some suitable precipitant so as to reduce the work of the organisms, and to enable them to concentrate their energies on the organic matter in solution.

Further researches supplied him with a precipitating material which was in itself an oxygen carrier, so that when it was mixed with the body of the sludge it supplied oxygen to the organisms who performed the work of destruction in the precipitated solids.

The organisms thus fully provided with the necessary stimulus to their life processes effect the reduction and oxidation without setting up putrefaction or causing the evolution of noxious gases.

Thus while the organic matter in the liquid is rendered harmless and inodorous, the solids are subjected to the same action. Sludge is formed, no doubt, but sludge which is absolutely unlike any other sewage sludge, presents no difficulties as regards disposal. It need not be pressed because it is always sweet, and it can be exposed and dried without the faintest trace of smell. It dries rapidly down to a small percentage of moisture and can be handled and carted like

garden mould, which it closely resembles; it has also proved a really useful manure.

Briefly then the result of nine years' work is to show that liquids containing organic matter in solution can be purified without filters and without land, and that wet sludge containing organic matter can be handled, dried, and utilised without danger, without offence, and without machinery.

These statements are being verified day by day, wherever Dr. Adeney's principles have been intelligently applied.

Meanwhile many other alternative methods for utilizing the beneficent action of micro-organisms have received considerable attention.

Mr. Dibdin proposes to dispense with all preliminary tanks and chemicals, and to subject the crude sewage itself to the direct action of the bacteria, through the instrumentality of artificial filters, relying solely on the aërobic organisms to effect the result.

Mr. Cameron claims that it is more advantageous to pass the sewage in the first instance through a closed tank, in which he contends that the anaërobic organisms effect the necessary preliminary changes which render the liquid more amenable to the filtration, which is the final stage of his process.

In both cases however it is claimed that no chemicals are used and no sludge is formed.

For the purpose of this paper it is not necessary to discuss the arguments or the evidence by which either of these claims is supported.

Let us for the moment assume sewage may be successfully treated in either of the three ways which have been mentioned. The controversy will then resolve itself into a mere question of relative cost.

At the meeting of the Sanitary Institute at Birmingham, the writer pointed out that additional evidence was still needed to show which was the most economical method. Artificial filters and large tanks involve considerable capital expenditure, and the life of a filter has still to be ascertained.

From the calculations which the writer has made, based upon the most recent estimates of the cost of bacterial filters, he has come to the conclusion that a process which includes the use of chemicals and the production of sludge may compare favourably with a really efficient purification plant which involves the construction and maintenance of artificial filters.

But before passing away from the sludge controversy it is is well to bear in mind that in every million gallons of average town sewage there is one ton of mineral matter in suspension, which the living organisms in the liquid are powerless either to

fy or to annihilate. If this mineral matter be intercepted in ıble tanks or catch pits, it will represent ten tons of wet ge containing ninety per cent. of moisture, for every million ons treated.

the face of this fact, how can it be seriously asserted that he use of biological filters there will be no sludge. It is possible to separate the mineral matter in suspension from heavier part of the organic matter, some of which must ain in the catch pits or tanks designed to intercept the ral matter and road detritus. The presence of organic tances will not only give rise to putrefaction, but will add e bulk of the wet sludge to be handled and disposed of.

on the other hand the crude sewage be allowed to flow on e filters without sedimentation, the mineral matter will be in the filters, and as it is finely divided it will fill up the s, and eventually choke up the filters.

ne other consideration is worthy of attention. At Sutton only is there a catch pit to intercept the heavier road itus, but there is a very perfect and most efficient mechanical ening machine, which separates a large percentage of the al matter, and almost all the paper.

he sewage comes down to the works very fresh, so much that neither the foeces nor the paper have had time to olve, and a large part of the organic matter never finds its to the filters at all.

he writer himself is satisfied that in every system of sewage tment there must be some residuum, which if it be not oved will sooner or later clog any filters, whereas if it be oved it constitutes sludge which must be handled and osed of, and the great charm of the bacterial filter and of septic tank disappears.

would appear to be preferable to face the cost and inconence of some preliminary treatment for the purpose of rating the solids day by day, rather than to run the risk lling up the voids in the filters, as the periodical renewal of filtering material will entail a serious charge on the rates.

hould experience prove that after all some preliminary tment is an absolute necessity in dealing with town sewage, that filtration can only be successfully adopted after some treatment, then it can easily be shown that the annual ge consequent upon the construction of artificial filters will esent a very much heavier burden than the application of Adeney's principles for dealing with the solids in solution.

rom his own observations the Author is convinced that withstanding the Barking experiments it will be found in tice that for the purpose of obtaining a good effluent by

filtration of a previously clarified sewage, it is necessary to provide two acres of artificial filters for every million gallons of liquid treated per day.

The cost of artificial filters under the most favourable circumstances will never be less than £2,000 per acre, and will often greatly exceed this amount; but even at this rate the interest and sinking fund will amount to £200 per annum per million gallons. This is equal in round figures to a rate of eleven shillings per million gallons filtered, without allowing anything at all for labour or for purchase of land. From these figures it would seem that we are not likely to materially reduce the cost of sewage treatment by the adoption of biological filters.

In support of this last proposition the writer will conclude by citing Mr. Baldwin Latham's figures as to the probable cost of artificial filters for Manchester, which he estimates at £300,000. Taking interest and sinking fund together at five per cent. this outlay would represent a charge of £15,000 a year for the construction alone (or £1 11s. 7d. per million gallons filtered), without allowing anything for land purchase, working expenses, and renewals, whereas the cost of purchasing and applying a suitable oxygen carrying compound to the clarified sewage of Manchester, which is calculated at 26 million gallons a day, would not amount to more than one-third of this sum.

Councillor A. Sidney Campkin (Cambridge) thought the arguments contained in the address to which they had listened were more suitable to the past than the present, and took them to a position which had been largely abandoned for some years. The chemical treatment of sewage had now comparatively few advocates, partly on account of its costliness, and the difficulty in disposing of the large amount of sludge created thereby, and the latter had caused great trouble in many localities, he believed, *especially* in the manufacturing districts. Although not applicable in every instance, from what they had learned from expert authorities at this and last year's Congress, the biological treatment of sewage had been found the most successful, and he believed the most economic. By bacteriological action, sludge had been completely disposed of, and the effluent from the beds of a sufficiently high standard to discharge into water-courses used for secondary purposes. They had many of them seen these results, and could bear testimony thereto. If these results were maintained, there was every reason to believe that sewage disposal by biological means would supersede the more costly and less effective chemical

treatment. As chairman of the Sewage Disposal Committee in his own town, where they were proposing a change of system, he was especially interested in the discussion of this subject, and considered it as the most important subject before the Congress.

Mr. G. Thudichum (London) said he had had as much experience in the treatment of sewage as most men, but he had never yet found any sludge that was not odorous. He had frequently had sludge offered to him for which it was claimed it had no smell, but was rather pleasing than otherwise. What he particularly wanted to speak about was the question of expense. The author said that the cost of artificial filters under the most favourable circumstance swould not be under £2,000 an acre. Under most favourable circumstances, they had made them for £700 an acre. That was fact, not theory. In comparing the expense of the particular process advocated with the Sutton or the septic-tank system, the author must not compare the cost of the precipitation-tank alone with the cost of beds and filters in the other. He must add the cost of the sludge-pressing machinery, the capitalised cost of the works and the chemicals employed, and he would then find that the money he would have to spend would be more than he reckoned. Sludge pressing was given at 2s. 6d. or 3s. per ton of cake, but his experience was that, when pressed on a large scale with the best plant, the average cost worked out at 4s. 6d. per ton. It followed that any process involving the production and disposal of sludge was a process of spending money, and they could not get this money back again. At Crossness, at first, they were able to sell the sludge at 2s. a load for manure, and then it was reduced to 1s., and then to 6d.; and at last they could not get it taken away at all. There were some cases where the sewage could not be treated bacterially, but only in a few instances, in which they had to deal with certain kinds of trade refuse, and he strongly objected to going back to such a method as that now advocated.

Mr. A. J. Martin (Exeter) said that it had been stated in the paper that the life of a bacterial filter had yet to be ascertained. He did not expect to live to see this point determined. It was conceivable, no doubt, that where a large amount of mud was carried on to a filter by the sewage its capacity might become exhausted; but with fine beds, which did not receive mud, that was not the case. Experience, extending over some years, showed conclusively that after the first few months there was no great reduction in the capacity of a filter. He would, however, make a concession to the author of the paper. In Exeter, they had to deal with a quantity of fine mud, which would not settle in the septic tank. It accumulated in the upper layer of the filters, and, no doubt, after a few years they would have to renew the top two or three inches. The body of the filter was not affected; on the contrary, it matured and did better work as it went on. There was a tendency to speak of all solid matter met with in sewage as "sludge," without regard to its

nature or composition. At Exeter, two grit chambers were formed in the septic tank to intercept mineral detritus, and during three years' working neither these nor the tank itself had required to be cleared out.

The PRESIDENT (Alderman J. Lemon) said that what he was afraid of in connection with this bacterial system was, that too much would be expected of it, and too much attempted, so that it would, in many cases, result in disappointment. There must be some preliminary treatment to deal with much that was washed down the sewers, otherwise the filters would be choked up. The less work that was given them to do, the more efficiently would they do it. Another point was, people were apt to run away with the idea that a filter could be constructed for less than nothing. Sutton was a clay district, and the filters were made cheaply. People expected to have filters made in the same way elsewhere, but the conditions were different. In some places, a filter at £2,000 might be cheap, it all depended on the kind of soil they had to deal with. If they had to make concrete bottoms, or even puddled walls, it was wonderful how the cost mounted up. They should not be led away by the different estimates of the cost, but they should investigate it for themselves under normal conditions, but in any case they would probably find that the bacterial system was a cheap form of dealing with it. Their thanks were due to the author of the paper.

Mr. Ross (Dublin) in reply said that the bacterial system was not in question. What Mr. Kaye Parry contended and proved was that sewage could be purified by bacteria without filtration, and that being so, the problem resolved itself into a question of the relative costs of the systems. In both cases there was a large amount of mineral matter brought down which must be treated mechanically, and must be removed, whether you call it "sludge" or some other name. As regards the cost of the filters various prices had been mentioned, and so many questions had to be considered, many of which could only be decided locally, that he would not attempt to reconcile them, but would leave the members to judge individually as to what the cost would be in his own particular locality.

CONGRESS AT SOUTHAMPTON.

SECTION III.

PHYSICS, CHEMISTRY, AND BIOLOGY.

PAPERS AND DISCUSSIONS.

"Present Problems in the Bacterial Treatment of Sewage," by W. J. DIBDIN, F.I.C., F.C.S., and GEORGE THUDICHUM, F.C.S.

(MEMBERS.)

Now that the principle of purifying sewage by fostering and assisting the action of micro-organisms is universally acknowledged, and large volumes of sewage are being daily treated by the aid of the microbes, it appears to the authors to be unnecessary to further discuss the general question at this stage. But, at the same time, there are many points of detail which require elucidation, and some of these the authors propose to touch on, rather with a view to inviting discussion than with the intention of dogmatising. Certain of them are of paramount importance. The questions of the water capacity of a bacteria bed after continued use for a length of time, and the relation between this and the material of which the bed is formed, are at the present time engaging the attention of many experimentalists. The results of the authors' own enquiries in this direction, and the conclusions arrived at therefrom, may probably be considered of interest. In the original one-acre pan-breeze bed at Barking Creek it was found that the water contents, which at the commencement of operations were nearly 40 per cent. of the whole cubic contents, had fallen, after three years' practically continuous working, to about 25 per cent., the amount varying during the three years between the latter figure and 35 per cent. The effluent that was applied to the Barking filter bed was far worse than any which would be obtained by the use of a septic tank or a coarse-grain bacteria bed on the Sutton plan, and it therefore follows that the work thrown upon the fine-grain bed was far more at Barking than at Sutton or Exeter per unit of effluent treated. Since, therefore, the Barking bed could satisfactorily deal with one million gallons per acre per day for a long period, or say an average of

three-quarters of a million, including all rests, and yet maintained a water capacity of 25 per cent., it appears only reasonable to conclude that a bed of similar material, but dealing with a better original effluent, would anyhow yield no lower result. Such a conclusion is also borne out by the results of many years' working at Sutton, where the fine beds continue in operation without any indications of a loss in water capacity.

When, however, the coarse grain beds come to be considered, an entirely different state of things is found. It is observed that in the case of a coarse bed made of coke or of burnt ballast, the water capacity shows a constant diminution to a point, decided apparently by local conditions, about which it remains, rising slightly after a short rest, falling again after a few weeks' work. This point may be fixed as low as 12·15 per cent. in some cases, in others averaging nearer 20 per cent. But when substances are employed which have a smoother surface than coke or burnt ballast, quite different results are obtained. With beds of granite or slate it has been found that whilst the effluent is not so good, the water capacity is far greater; and the inferior quality of the coarse bed effluent does not affect its final purification by a fine bed of coke breeze or cinder. This is very marked in the case of slate, an experimental bed filled with this material having constantly yielded an effluent in which the organic impurity in solution was hardly reduced at all, if compared with the original sewage, whilst the whole of the sludge was removed and the effluent was readily purified on a fine grain bed. The water capacity also of the slate bed, as also that of the granite bed already mentioned, was high and constant. It is suggested as a reason for this that the smooth surface permits the attached matters, in an extremely fine state of sub-division, to be carried away by the effluent discharging on to the fine bed, which is quite capable of dealing with them as well as with the matters in solution. A similar condition obtains when the septic tank is employed instead of a coarse grain bacteria bed, the tank effluent containing from seven to ten grains per gallon of suspended matters, chiefly organic and very finely divided; and in this case also the fine grain bed is able to sufficiently purify the effluent to justify its direct discharge into a stream. It may be therefore that instead of looking for a material such as broken coke, by which the greatest amount of work is done by the primary, and a minimum duty thrown on the secondary beds, economic considerations, both of cost of material and of space, will point to the adoption for coarse grain beds of a harder and smoother material, such as slates or broken tiles, leaving more work to be accomplished by the fine grain beds.

The authors have obtained very successful results on a laboratory scale, by the use of broken glass, in the case of which the water capacity of the bed remained practically unchanged after many months, the bed being worked twelve times each week, and the main points, the absolute removal of sludge, and the production of an effluent in a fit condition for final purification by a fine bed, were satisfactorily met.

That these points are of the greatest importance, not only from the water capacity, but also from other points of view, will be very clear to all who, like the authors of this paper, have had to search for suitable bed materials on a large scale. Coke is scarce and dear; burnt ballast cannot be obtained in all localities without heavy charges for carriage; but, in most places, there will be found some material or other which, in the light of the facts stated, may be quite as suitable, or even more so, apart from the fact of its being cheaper and on the spot.

Another very important question is that of the size of bed-material most suitable for the purpose intended. The experts advising the Manchester Corporation appear to be inclined to the belief that the coarse grain bed should be very much finer than has hitherto been the case; in fact, they seem to advocate the use of two fine grain beds. But, looked at in the light of large experience, this does not seem to the authors to be practical. The object in view in employing a bed of coarse materials is to admit the particles of suspended matter contained in the crude sewage into the body of the bed, there to be solutionized and destroyed; this would be entirely frustrated by making the bed material of a fine grade, since the suspended matters would, undoubtedly, collect on the top, and would have to be dealt with separately at frequent intervals, unless the sewage were previously settled to a considerable extent; and, in either case, the problem of sludge disposal must arise—the very problem which is so effectually solved by the use of a coarse grain bacteria bed, or a septic tank. The size of bed material, which the authors have in practice found most suitable is in the case of a coarse bed that which will pass through a two-inch ring (about) and be all rejected by a screen having a half-inch mesh; and for a fine bed that which will pass a screen of three-eighths or quarter-inch mesh, and be rejected by one having a mesh of one-sixteenth of an inch. The former is coarse enough to admit the particles of suspended matter and yet fine enough to prevent their being too readily washed out; whilst the fine grain bed will admit into its interstices any particles which may be discharged from the coarse bed, and will itself produce an effluent absolutely free from suspended matter.

As a result of the experiments carried out at Barking Creek the authors, some years ago, fixed the limit of the time during which the sewage remained in contact with the bed-material at about two hours. Time has only served to confirm this view. Many experimentalists work their beds on what may be called the "intermittently continuous" system; that is to say, the sewage, or crude effluent, as the case may be, is passed continuously through the beds for a given number of hours, the beds resting empty during the remainder of the day. Good results have been obtained in many cases, but the authors have found the most uniform effluents to be produced by the plan originally adopted at Barking and Sutton. The continuous method is, however, both permissible and convenient when it is desirable to treat an effluent by a third set of beds,—as, for instance, in the case of a sewage highly charged with iron. Continuous filtration through a bed of coarse sand will remove the iron, which otherwise, becoming oxidised, discolours the effluent and produces finally a deposit, which—although unobjectionable from a chemical point of view—offends the eye and assists in silting up a stream, and should therefore be removed.

A very interesting problem is that concerning the disappearance of a large proportion of the organic nitrogen. It was formerly supposed that practically the whole was converted into nitrate, and was then used, in the case of sewage farms, as plant food. It has, however, now been recognised for some time that the total nitrogen found in a sewage effluent was always less than that existing in the original sewage, even when the effluent was not used for irrigation, and the loss of nitrogen could not, therefore, be ascribed to its abstraction by crops. A very striking instance has lately been observed. Burnt ale, the residue from the first distillation of whisky, has for some time engaged the attention of those concerned in the maintenance of the purity of salmon-producing rivers in the north of Scotland, particularly in the valley of the Spey; and the authors have succeeded in dealing with this very refractory waste by an adaptation of the aërobic bacterial system. The original refuse yields some 30 to 40 grains of saline ammonia, and 40 to 60 grains of organic ammonia; in the effluent produced the saline ammonia is almost nil, and the albuminoid only 0·1 grain per gallon; and yet nitrates are almost absent, reaching as a rule less than 0·2 grain, or only one-tenth of that generally found in the bacterial effluent from the Sutton sewage. This disappearance of between 70 and 80 grains of [illegible]ll nitrogen may perhaps only be explained by the hypothesis [illegible]d that a nitrifying and a reducing organism are in simultaneous [illegible] action, the nitrate being produced from the organic

nitrogen through ammonia by the first set of organisms, and immediately reduced and freed, probably in combined nitrogen, by the other set. The effluent so produced from the burnt ale is clear, colourless, inodourous and not liable to secondary putrefactive decomposition, being of excellent quality; in fact, the authors have succeeded in obtaining salmon fry from ova, using this effluent alone and undiluted. And here the authors desire to call attention to the danger of judging effluents by any fixed standard whatever. The Medical Officer for Derbyshire, for example, suggests that a certain proportion of nitrates should be insisted on, in order to prevent a local authority from reducing the apparent organic impurity by mere dilution; if, however, any considerable amount of distillery, or, to a lesser degree, of brewery waste, be admitted to the sewers, it may become impossible to attain this standard, although the effluent is in all regards fit to be directly admitted into a stream. In deciding upon the the quality of an effluent, therefore, the source of the sewage should be taken into consideration in addition to the actual analytical results obtained. It may be added that the above phenomenon is observed when the burnt ale has been rendered slightly alkaline by the addition of lime prior to treatment, as well as when it is treated in its natural acid condition. In the latter case the organic acid is destroyed and the final effluent is neutral or very faintly alkaline.

The present requirements of the Local Government Board with regard to the treatment of storm water have caused the problem of the disposal of the latter to become very prominent of late. It is at present insisted on that two volumes of storm water, plus the normal sewage, must be treated as sewage proper, whilst an additional three volumes must receive special treatment either by a filter used for that purpose only or by an area of land also put to no other use. In designing sewage-purification works, therefore, local authorities must provide for the treatment of six times the normal dry-weather flow. In the case of the Sutton method of treatment, this has to be met by constructing the beds of such a size that they will deal with the ordinary flow by being used once only each day; in times of storm they are filled up to three times daily, thus meeting the wishes of the Local Government Board regarding the first two additional volumes of water. Experience has proved to the authors that beyond this the beds can deal with the further required three volumes, or very much more if need be, by the simple process of streaming, the beds being kept full of water during the process. The deterioration suffered by a bacteria bed during this operation is but slight, and full efficiency is soon regained: whilst the purification of the storm sewage is

satisfactorily effected. It should, however, be pointed out that the Local Government Board will not as yet recognize this method, and therefore the supplemental filter or land must be provided in all cases in which sanction is sought from that authority. In the case of a septic tank there is also no doubt that a quantity of storm sewage five times greater than the normal volume can be safely and properly treated; the suspended solids will be deposited, and the active scum remain undisturbed; so that the efficiency of the tank will be but very slightly impaired, and will soon be regained.

There are many other points upon which the authors would gladly dwell did space permit: the researches into the variations in the quality of an effluent during the discharge from a single bed; the using of land itself as a bacteria bed by locking the under-drains; the effect of iron being present in the bed material; and many more. But, as already stated, this paper is intended rather to suggest points worthy of intended discussion, and the authors trust Members of this Congress will respond to the invitation so extended.

[*For discussion on this paper see page* 657.]

Some further Experiments and Results in Bacteriological Treatment of Sewage with especial reference to Filtration through Coal, by Prof. A. BOSTOCK HILL, M.D., D.P.H.Camb. F.I.C., and JOSEPH GARFIELD, A.M.Inst.C.E.

IT is just two years since one of us at the Congress of the Institute, held at Leeds, introduced the subject of filtration through coal as a means for the purification of sewage. Since then, we have been continuously experimenting in the same direction, and have had the opportunity of observing not only the results produced experimentally, but also on a comparatively large scale, as in the case of the City of Lichfield a sufficient area of coal filters has been at work for some months to deal with the whole daily flow, exclusive of night, of the sewage. We may here remark that the Corporation of the City of Lichfield some years ago found themselves in an unfortunate position, as not only was an injunction obtained by the Earl of Lichfield against them for the pollution of a stream running

through his property, but further a sequestration order was granted, but was allowed to remain in abeyance while certain works were carried out.

Up to this time the sewage, which contains a large proportion of brewery waste, had been treated by precipitation with lime and alumina, and then passed on to a large acreage of land. Owing partly to the nature of the land, and partly to the fact of the presence of brewery waste, the effluent produced was unsatisfactory in character, and owing to secondary decomposition occurring in the stream with the consequent production of mud, a condition of affairs was produced which was not only a very serious nuisance, but one which, according to the evidence of veterinarians, produced illness and death in the case of cattle gaining access to the stream.

Under these circumstances then, it was absolutely necessary that a different kind of treatment should be originated, and after a consultation of the experts, engineering and chemical, acting for the Earl on the one hand, and the Corporation on the other, with the concurrence of the County Medical Officer of Health, large experimental coal filters were laid down for the purpose of observing what results could be obtained in the course of a twelve months' trial. The analyses which are quoted at the end of this Paper in tabular form (p. 650), show that an effluent was produced which was of excellent character chemically, and did not tend to decompose and give out the odour of brewery refuse as was invariably the case with that which had passed through the land. The Corporation afterwards determined to lay down first of all a sufficient area of coal filters to deal with half the sewage of the town, and if these were satisfactory it was the intention to lay down a further number of filters sufficient to deal with the whole of the sewage, thus taking all the sewage off the land on account of its inability to deal with it.

The works at present in use are as follows: modern tanks for precipitation had been constructed some years ago, and as these were still ample in size and produced a good tank effluent free from suspended matter, it was decided to still continue precipitation and deal only with the effluent on filters, just as it had been allowed previously to run on to the land. The following are the details of construction of the filters laid down. The filters—four in number—have a total area of 1,340 square yards. The clay soil was excavated to a depth of 5 ft. 6 in., a 9 in. main drain with 4 in. branches laid in each tank, which was then filled up to a depth of 5 ft. with coal. The sides being earthwork are sloping and the bottom of each filter is formed of the natural clay. The filters are placed at a lower level than

the bottom of the precipitation tanks, and the fall utilised to distribute the sewage over the filters, which distribution is done by means of perforated tubes. Valves are fixed on the main distributing so that one half only of any filter can be worked without the other. The underdrains are always open.

Directly after the earlier filters were completed, tank effluent first at the rate of half a million and then at one million gallons per acre per diem was allowed to pass through, and it will be observed as has before been pointed out by one of us that while the albuminoid ammonia and the amount of oxygen absorbed are both largely reduced there was, as one would expect, no evidence of nitrification, and it will be observed that it w[illegible] weeks before any marked quantity of nitrates appeare[illegible]iltrate.

Why coal should have th[illegible]rty of producing a good effluent from the very first b[illegible]itrification is taking place we cannot say, nor indeed, a[illegible]e know, has any probable suggestion been made as to [illegible], but the fact remains, as any unprejudiced observer [illegible]ver for himself. We are aware that certain observers [illegible]iled to obtain good results with coal as a filtering medium for sewage, but we are absolutely certain, both from our own results [illegible]nd from others carried out by ourselves and by others in many parts of the country, that coal has this power of producing a better, a clearer, and a more highly nitrified effluent for the same rate of filtration than any other medium which has hitherto been suggested.

At the present time we know of more than one scheme proposed which coal is to be the filtering medium for the purification of sewage, and we have little reason to doubt that when its powers have become better known it will be very largely used in suitable districts. We consider that the results obtained at Lichfield on the practical scale are perfectly satisfactory, and as there is no difficulty in utilizing the sludge from the precipitation tanks there is no reason why a "sludge difficulty" should present itself here. But though this be the case in this particular instance we have become convinced of the desirability of endeavouring, if possible, to avoid the necessity and expense of precipitation, and we have during the last two years, owing to the courtesy of the Sewage Committee of the Corporation of Wolverhampton, carried out many experiments to see how far this difficulty might be solved. We were of course, aware of what had been done by the Septic Tank Syndicate, and also by the roughing filters in the way of resolving solids in sewage, and we determined to set up a plant by means of which we could deal with the sewage first by a tank on the septic tank principle, afterwards completing the treatment by coal filtration. We decided to try

the experiment with Wolverhampton sewage, because of its character and the fact that it contains always a considerable proportion of chemical refuse, from time to time, free acid and always proto salts of iron as a result of the galvanizing and other processes carried on so largely in the neighbourhood. The first point we desired to settle was whether or not the amount of acid and iron and other salts in the sewage could be dealt with in a tank, the solids resolved, and the tank effluent treated satisfactorily afterwards by filtration. The following experiments were carried out.

In the first place, every precaution was taken to ensure that the sewage used in the experiment was a fair average sample of Wolverhampton sewage. Measured quantities were taken from the main outfall sewer every half-hour night and day. This sewage was run direct into a small tank—of no special design—which we call the resolving tank. The volume thus taken in two days was sufficient to fill the tank once. The effluent from this resolving tank was conveyed on to a coal filter, 5 ft. deep, at the rate of 200 gallons per square yard in thirty hours. The filter was worked twenty hours and rested four hours each day, the outlet open all the time.

Frequent analyses of the tank effluent and of the filtrate were made, and we found that not only was there practically a complete resolution of the solid matters other than mineral, but that a tank effluent was produced which, particularly after a time, was admirably adapted for final filtration through coal. It has been urged by opponents of what is known as the septic tank system that the tank effluent produced is not in a condition to be satisfactorily treated by oxidizing filters. This statement, however, our experiments completely disproved; and we are of opinion that any ordinary sewage can be so treated, and a result obtained as good, or even better, than any yet introduced to public notice. We considered that the experiment proved that the chemical and acid character of the sewage was not inimical to microbical life; and, as the analyses show, we produced a very high-class effluent. In the course of two months, however, we found a difficulty arising. Although the acid and iron salts did not prejudicially affect the bacteria in the tank, yet we found that all the iron salts in solution were not precipitated. The consequence was that we got an ever-increasing amount of oxide of iron deposited in the filters, so that in time we found that we were unable to filter the same amount as we had done previously, and indeed, in time, the filters apparently became almost blocked up. It is curious, by the way, to note here that a month's rest was sufficient to enable the filters to again perform their full share of work, filtering again at the

rate of one million gallons per acre per day, but that in a much shorter time than before another blockage occurred. This succession went on for seven months, when all the iron salts in solution were found to be precipitated in the resolving tank, the effluent from which was alkaline to litmus. After this time no further blockage of the filter occurred, and the filtrate improved in quality.

We should here like to emphasize the fact that for the first seven months the experiment appeared to be a failure as far as the life of the filter was concerned, and it was only by continuing the experiment for what appeared to be an abnormal time that we found that in a sewage of the type of the Wolverhampton sewage it is not essential to get rid of the dissolved iron salts by the usual method of precipitation to prevent the blocking up of the filters.

Notwithstanding the fact that this result was hoped for when the experiment was started, we think that further experiments must prove whether or not such a result can be obtained in practice on such a sewage as that of Wolverhampton.

We next proceeded to see if it were possible in connection with our resolving tanks to use a smaller quantity of lime than was used ordinarily in the precipitation tanks, and as a result, we find that we can effect a saving of four grains of lime per gallon, and at the same time produce a high class effluent, without any risk of blocking up the pores of the filter. Although we found that for some weeks after the experiment was started a little of the precipitated iron salts was again thrown into solution by some apparently bacterial action in the tank; after a lapse of two months another change took place, no iron salts were found in solution and a much better filtrate was produced than was the case previously. We think it only proper to state here how much we consider that we, and others, are indebted to Mr. Cameron of Exeter, for the introduction of what is now so widely known as the "septic tank," and we consider it now definitely proved that when dealing with ordinary town sewage, that is, one containing but a very small proportion of manufacturers' waste, it is perfectly possible to deal with the organic solids by this means without the aid of preliminary precipitation, and that therefore, to this extent the sludge problem has been settled.

It is alleged by many people that there is nothing new in the septic tank. This statement is doubtless perfectly true, but an appreciation of the powers, and the possible adaptation of the method was not understood until it was introduced as a result of the experiments at Exeter and elsewhere of Mr. Cameron. We feel we should also state here that in our experiments we have not used any of the clever mechanical contrivances

associated with the septic tank proper, or "Exeter system," and we consider therefore it is fairer not to use the word "septic" tank, but we prefer in order to prevent any confusion to use the word "resolving" tank in connection with our experiments.

As an instance of the power of the organisms in the resolving tank of dealing with the sludge, we found that in one tank even with limed sewage at Wolverhampton, we had a reduction of four-fifths of the sludge. In connection with this matter the following facts are interesting. The sewage of Wolverhampton has been treated in two parts, called respectively high level and low level sewage. It has long been observed, and indeed was pointed out many years ago, that the land effluent of the high level sewage was always of extraordinarily good quality, very much better than the low level sewage effluent, and although perhaps the quality of the land in the one case was somewhat better than the other, it was difficult to believe that the difference in the quality of the land effluents could be due solely to this cause. The high level sewage, however, passes through a siphon on its way to the outfall, and observations carried on by us show that this siphon holds a quantity of sewage continually, equivalent to about a twenty-four hours flow, so that in fact many years ago involuntarily a resolving tank was constructed in which resolution of the organic solids was being carried out, and we have no doubt that, as an analysis attached to this paper shows, that the excellence of this result is due to the fact that we are dealing really with an effluent which has practically passed through a resolving tank. We may add, too, that in the high level sewage at Wolverhampton there is no neutralization and precipitation as there is in the case of the low level sewage.

A word or two on the question of standards may not be out of place. If it were possible no doubt it would be very desirable to fix a standard of pollution, below which no effluent or filtrate could be allowed to run into a stream, but it must be borne in mind that all such standards must depend on one or more results obtained by chemical processes, and in our experience we find that this cannot, in the case of different sewages, be relied upon to furnish concordant results. For instance, we know of effluents containing ·1 per 100,000 of albuminoid ammonia which are of comparatively good quality, while effluents containing a smaller quantity than this in other instances are liable to become putrescent, undergo secondary decomposition, and produce considerable pollutions when turned into streams. Even the question of the amount of nitric nitrogen, which, speaking generally, may be considered a good index of purification, cannot always be relied upon, as our experiments shew that

Results in Parts per 100,000.

Date.	Description.	Total solid Matter.	Free Ammonia.	Organic Ammonia.	Nitrogen as Nitrates and Nitrites.	Oxygen consumed in Four Hours.	Chlorine.	Remarks
1897.	*Lichfield Experimental Filters.*							
Dec. 8th	Tank Effluent	60·0	1·200	0·320	·0	0· 76	4· 4	
" "	Coal Filter Effluent	62·0	1·200	0·048	0·33	0·172	5·60	
1898.								
Jan. 5th	Tank Effluent	62·0	1·000	0·200	0·0	0·772	5·2	
" "	Coal Filter Effluent	72·0	0·839	0.029	0·55	0·151	6·7	
Feb. 23rd	Tank Effluent	68·0	2·000	0·300	0·0	1·372	6·2	
" "	Coal Filter Effluent	72·0	0·600	0·028	0·66	0·150	8·0	
July 7th............	Coal Filter Effluent	92·0	0·150	0·012	1·87	0·21	7·9	
1899.								
March 16th	Coal Filter Effluent	78·0	0·902	0·060	0·88	0·376	9·4	
	Lichfield Large Filters in actual use.							
March 16th	No. 1 Filter Effluent	76·0	1·006	0·056	trace.	0·275	11·6	Bright and clear.
April 12th	No. 1 Coal Filter Effluent	70·0	1·416	0·036	0·11	0·252	8·7	" "
" "	No. 2 " " "	60·0	1·420	0·036	0·11	0·216	8·8	" "
March 7th	No. 1 " " "	80·0	2·200	0·040	trace.	0·204	7·7	" "
	No. 2 " " "	78·0	2·000	0·032	trace.	0·200	11·6	" "

COUNTY ANALYST'S LABORATORY, UNITY BUILDINGS, TEMPLE STREET, BIRMINGHAM.

Results of Analysis Expressed in Parts per 100,000.

Date o Receipt of Sample.	Description.	Total solid Impurity.	Free Ammonia.	Organic Ammonia.	Nitrogen as Nitrates and Nitrites.	Oxygen absorbed in Four Hours.	Chlorine.	Remarks
1899.	*Wolverhampton Experiments.*							
Aug. 3rd............	a. Raw Sewage Resolving Tank Effluent	134·0	6.40	0·32	·0	9·70	32·1	Black and turbid.
" "	a. " " Filter Effluent	160·0	0·032	0·024	5·83	0·258	29·4	Bright and clear.
" "	b. Limed Sewage Resolving Tank Effluent	142·0	5·32	0·24	·0	6·40	27·9	Black and turbid.
" "	b. " " Filter Effluent	144·0	0·016	0·024	6·16	0·40	27·9	Black and clear.
Jan. 19th	Resolving Tank Effluent	132·0	2·664	·380	trace.	2·132	18·5	
" "	Coal Filter Effluent	120·0	1·780	·048	1·10	0·308	19·0	
Feb. 3rd	Resolving Tank Effluent	170·0	4·580	·400	·0	2·54	34·9	
" "	Coal Filter Effluent	160·0	3·270	·070	1·87	0·202	30·6	
May 3rd............	Effluent Limed from Resolving Tank ...	136·0	6·090	0·260	·0	3.50	25·5	
" "	Coal Filter Effluent	164·0	0·120	0·032	4·07	0·192	24·9	Bright.
June 29th	High Level Outfall Tank Effluent	92·0	2·000	0·560	·0	3·344	12·8	Black and turbid.
" "	" " " Land Effluent........	90·0	0·060	0·010	1·87	—	14·6	Clear and bright.

in strong sewages it is easy at times to produce a considerable quantity of nitrate while the effluent still remains bad, stinking, putrescent, and polluting. In fact, we are of opinion that the stronger the sewage under certain circumstances the more nitrate can be produced without there being a proportionate degree of purification.

In conclusion we wish, as we have repeatedly done before, to disclaim any belief in the purification by coal as a filtering medium other than that of its being an excellent medium for the growth of the oxidizing bacteria. We know that good results can be obtained with other media, but our experience and experiments distinctly and definitely point to the fact that at equal rates of flow through the filters better results can be obtained with coal than with any substance previously suggested. We have not in this Paper dealt afresh with many of the elementary points connected with coal as a filtering medium for sewage, as nothing material has come to light since the Paper read by one of us at Leeds in 1897.

Report of E. W. T. Jones, F.I.C., Public Analyst for Staffordshire, &c., &c.

Samples of Resolving Tank Effluent and Coal Filter Effluent, taken July 18th, 1899.

	Parts 100,000. Tank.	Filter.
Total solid matter, dried 212° F.	116·00	155·00
Free and saline ammonia ...	7·35	0·016
Alb. ammonia	0·33	0·046
Nitrogen as nitrates	0·00	7·000
Combined chlorine	24·50	22·10
Oxygen absorbed in 4 hrs., 80° F.	7·36	0·243
Appearances	Black.	Clear & colourless.
Smell	Very offensive.	None.
Reaction to litmus ...	Slightly alkaline.	Neutral.

The above analyses show a wonderful achievement in sewage treatment. The filter effluent is physically more like a drinking water than a sewage effluent, and in chemical composition it is surpassingly satisfactory.

[*For discussion on this paper see page* 657.]

"*High Nitrification in Sewage Filtrates*," *by* W. D. SCOTT-MONCRIEFF.

(FELLOW.)

WHEN the story of the sewage problem in this country comes to be written, after its various phases have been foreshortened by the passage of time, certain features will come into prominence, which are at present regarded as of minor importance.

One of these will be the value of highly nitrified effluents as plant food.

Consciously or unconsciously, the vast every-day operations of nature, whether upon cultivated land or the open prairie or forest, have always been a great factor in directing the mind towards the true solution of the problem. The natural method by which organic nitrogen is mineralised to nitrogen as nitrates, may be spoken of as the high road which completes a circle, and all chemical devices, however ingenious, as only *culs-de-sac* or wanderings to nowhere.

Fifty years ago Chadwick and his followers looked upon a well-managed sewage farm as a full and sufficient remedy for all the troubles of great communities in disposing of their sewage, and bright pictures were drawn of the profits that would accrue from the acres that were fattened by their schemes. A higher note was struck by Warrington in 1850, when he read his paper before the Chemical Society, on "The adjustment of the relations between the Animal and Vegetable Kingdoms, by which the vital functions of both are permanently maintained." As years went on it was discovered that the average sewage farm did not provide for the adjustment of these relations, and this adjustment may be truly spoken of as the crux of the whole problem. Warrington saw the main point clearly, but he had no data to go upon sufficient to enable him to offer a practical remedy.

It would occupy far more time than is now placed at my disposal, and would be outside the scope of my present purpose if I attempted to fill in the gap between the state of knowledge now, and that which existed in 1850. What I wish to make clear is that the disappointment arising from the failure of sewage farms as sources of profit are now fully accounted for, and they

are not justified and should not be reckoned in dealing with more advanced methods in which the relations between the animal and vegetable kingdoms have been thoroughly adjusted, in other words, and to put it quite clearly, the solution of the sewage problem on purely natural lines, as suggested by Warrington, if realised, must be profitable in the very nature of things, so long as men, and animals, and plants continue to be constituted as they are at present, and this, for the simple reason that where the cost of the necessary conditions is moderate the work itself is carried out for nothing.

Looking at the question from a quite contemporary standpoint, there are one or two features of the problem which have been brought into prominent notice within the last twelve months, which might be spoken of as coincidences if they had not the common bond arising from a general movement of scientific interest in a particular direction.

The first of these I shall mention is Sir William Crookes' Presidential address to the British Association at Bristol. The second a Paper by Mr. Daniel Pidgeon in the current number of the Royal Agricultural Society Journal upon the bacterial purification of sewage, and the third, which is quite a coincidence, a Paper by Mr. W. E. Bear on fruit farming in England, which immediately follows the previous Paper in the same journal.

In the first paper, Sir Wm. Crookes points out the urgent necessity which exists for restoring nitrogen to the soil, and estimates the loss arising from the wasted sewage of this country alone at £16,000,000 per annum. This sum would pay 3 per cent. on a capital expenditure of £320,000,000, and still provide £6,400,000 per annum for wages and depreciation.

In the second paper, Mr. Pidgeon deals with the bacterial treatment of sewage in a most interesting and masterly *résumé* of the whole subject, and a clear perception of the ultimate lines which the progress of the system is certain to take in the direction of a high nitrification of the filtrates.

In the third paper, Mr. Bear deals with the enormous present production of fruit under highly artificial conditions, and gives the return of grapes at an average of 12 tons per acre, or 14 tons from vines in full bearing, and of tomatoes at an average of 20 tons per acre, both crops to a great extent being grown upon the same acreage.

These apparently disjointed contributions may be connected as follows:—

1st. The enormous importance of nitrogen, as nitrates, for the nourishment of plants.

2nd. The capacity of the bacterial processes to produce and

conserve nitrates as the mineralized equivalent of the organic nitrogen in sewage.

3rd. The marvellous productiveness of land under highly artificial conditions at present in vogue, which would be greatly increased if highly nitrified effluents were available.

The paper by the President of the British Association speaks for itself, and the figures he gives, even if greatly modified so as to cover only the amount of sewage which could be dealt with in practice, would still be sufficiently startling, but the point of most importance is that bacterial processes, if properly carried out, do realise these figures in terms of nitric nitrogen per gallon of sewage purified by this method. Ninety per cent. nitrification of the total nitrogen in the effluent can easily be obtained from ordinary sewage, and this, based upon the cost of nitrate of soda, works out to about £14,000,000 per annum for the sewage of the United Kingdom. It should be clearly understood by every one interested in the biolytic purification of sewage, that the failure to realise the promises of profit from sewage farms has no bearing upon the present state of the case, because when raw sewage has been broken down to nitric nitrogen, carbonic acid and water, the problem of the final adjustment spoken of by Mr. Warrington has been quite as completely solved as the problem of purification. They are inseparable, and the one is the counterpart of the other. It is nature's method, and whatever she does is done to perfection when favourable conditions are provided.

The following is the standard solution adopted by Nobbe as a model plant food supplied in parts per 100,000:—

Lime	16	Chlorine... ...	21
Magnesia ...	3	Oxide of Iron ...	·5
Potash	31	Nitrogen... ...	8·2
Phosphoric Acid...	7		

Dr. Voelcker, in a letter to Mr. Pidgeon, speaks of this solution as "containing those constituents and the amounts of each which have been found to be requisite for plant growth, and the absence of any of which or the supply in markedly lesser quantity of which would produce deterioration while the larger supply of any of which would not be attended by increased benefit."

To show how rapidly the bacterial purification of sewage approaches this standard solution in the all important element of nitrogen, I reproduce Dr. Rideal's analysis of the Ashtead experiments from which it will be seen that the nitric nitrogen figures are identical with those of the standard solution between the 8th and 9th trays.

Table showing successive stages of Mineralization by Nitrifying Organisms. Ashstead Experiments, February, 1898.

Description of Samples.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Chlorine.	Free NH_3	N	Albuminoid NH_3	N	Oxygen consumed	O. consumed minus O. required by Nitrous Nitrogen	Nitrous Nitrogen.	=Oxygen required.	Nitric Nitrogen.	=Useful Oxygen. N_2O_5 to N_2O.	Total Oxidised Nitrogen.	Available Oxygen useful, O. Nitrate=O. consumed.	Total Unoxidised N. (Kjeldahl).	Total Organic Nitrogen.	Total Inorganic Nitrogen.	Total Nitrogen of all kinds.
Effluent from Cultivation Tank, taken 3 and 5 p.m.	9·0	12·5	10·30	1·59	1·23	9·843	9·843	Nil	—	0·12	0·274	0·12	− 9·57	12·35	2·05	10·42	12·47
1. Effluent from First Tray	9·0	10·5	8·65	1·25	1·03	6·694	5·56	0·99	1·13	0·096	0·219	1·036	− 6·47	11·5	2·85	9·74	12·59
2. Effluent from Second Tray	8·5	9·0	7·42	1·00	0·82	5·773	4·74	0·90	1·03	0·48	1·09	1·38	− 4·66	11·10	3·68	8·80	12·48
3. Effluent from Third Tray	8·5	5·0	4·12	0·60	0·49	4·493	3·60	0·78	0·59	1·87	4·27	2·65	− 0·22	6·60	2·48	6·77	9·25
4. Effluent from Fourth Tray	8·0	4·0	3·3	0·35	0·29	1·728	0·98	0·66	0·75	2·76	6·30	3·42	+ 4·58	5·15	1·85	6·72	8·57
5. Effluent from Fifth Tray	7·75	1·5	1·24	0·15	0·12	1·28	0·73	0·48	0·55	4·68	10·70	5·16	+ 9·42	1·75	0·51	6·40	6·91
6. Effluent from Sixth Tray	8·0	1·75	1·41	0·35	0·29	1·497	0·92	0·51	0,58	4·416	10·10	4·926	+ 8·01	2·25	0·81	6·37	7·18
7. Effluent from Seventh Tray	7·5	0·35	0·29	0·30	0·25	0·755	0·755	Nil	—	6·6	15·08	6·6	+14,33	0·85	0·56	6·89	7·45
8. Effluent from Eighth Tray	7·5	0·20	0·165	0·65	0·53	0·397	0·397	Nil	—	7·32	16·73	7·32	+16·34	1·03	0·835	7·48	8·35
9. Effluent from Ninth Tray	7·5	0·25	0·206	0·60	0·49	0·589	0·589	Slight trace	—	9·0	20,0	9·0	+20·1	0·60	0·394	9·21	9·60

Colonies of Aërobic Nitrifying Organisms.

It follows from these figures that in the bacterial purification of sewage it is not only purification in its best sense that is obtained, but also a supply of nitrogen ready prepared for plant food which, if generally available, would postpone the pressure of population upon food supplies among civilized communities for an indefinite time.

At the present moment, disappointment about the broken promises of profit in the past seems to make everyone look upon sewage only as a nuisance to be got rid of; but the adjustment referred to by Warrington in 1850 has lost none of its significance.

It is now certain that this adjustment is effected by bacterial processes when properly conducted, and profit must follow to the community if these highly nitrified effluents can be utilised without too much expense being incurred in obtaining them. As I have already said, when the conditions are once provided the work itself is done for nothing.

I would much like to see a start made in such a community as Worthing, where the filtrates could easily be passed on to the fruit growers.

[*This discussion applies to the papers by* W. J. Dibdin and George Thudichum, Prof. A. Bostock Hill and Joseph Garfield, and W. D. Scott-Moncrieff.]

Dr. Arthur Angell (Hants County Analyst) said he was now fully convinced that the only proper method of treating sewage was on biological lines. He discouraged the idea of producing a profit from the sludge, and as to filtration, expressed the opinion that there was nothing *per se* in the kind of material used. One point had not yet been touched upon, and they must not put their heads in a sack in regard to it. The methods of disposal of sewage by microbic agency are really processes of putrefaction, and at present, apparently, they knew of no way of preventing the formation of obnoxious gases in the tanks. He had not heard of anyone successfully collecting and managing those gases.

Mr. A. J. Martin (Exeter) referring to a remark of the previous speaker, said that the production of gas was a necessary accompaniment of the work of a septic tank. There was, however, no difficulty in rendering the gas innocuous. At Exeter a part of it was burnt and utilized for lighting the works at night. Another method, which combined the merits of simplicity and efficiency, consisted in allowing the gases to filter through the roof arches and the thick

layer of soil covering the tanks. No better way of deodorising these gases could well be devised. A great deal had been said with regard to the respective merits of different filtering materials. He joined issue with the reader of the paper on filtration through coal, when he attributed the excellence of the results he had obtained to the nature of the material used. He (the speaker) was of opinion that these results were due rather to the skill and judgment which were used in grading the material, than to the nature of the material itself. Too much stress could not be laid upon the importance of thoroughly mingling the effluent passing through a filter with air. Mr. Dibdin's method of first filling a filter with effluent and then discharging it, so that wherever the water went air should follow, was the best practical way of effecting this on a large scale. He regretted that Mr. Cameron was not present to hear the handsome acknowledgments which had been made of his work.

Dr. L. P. Kinnicutt (Massachusetts) said a few words respecting the change which had come over the methods of sewage purification adopted in England during recent years, and adduced facts in regard to Massachusetts (see p. 660).

Lieutenant-Colonel A. S. Jones (Finchampstead) said Mr. Dibdin's paper supplied a good deal of information as to the progress which had been made in his experiments, and he was glad to know that they were being followed up. As to Dr. Hill's paper, he thought it was pretty well agreed that whether it was broken glass, coal, ballast, or anything else which was used, the main thing was the way in which it was put together. Everything depended on getting a sufficient space for the air to come in, and it was advisable to drain off the very last portion of the water by an air-pump, so as to bring in a fresh supply of air throughout the filter. As to Mr. Scott-Moncrieff's paper, he went back to the old notion of making a profit on the sludge, and there he was on the wrong line. "Sludge, like the poor," the Colonel added, "we shall always have with us." And he desired to express his regret that the Septic Tank Syndicate had been allowed to parade an advertisement—"No more sludge"—in the Congress Exhibition. Referring to Dr. Bostock Hill's paper, Colonel Jones remarked on the new name "resolving chamber" for the old cesspool, or "septic tank," as Mr. Cameron called it.

Mr. E. G. Mawbey (Leicester) observed that in Leicester they got on well for some time with a sewage farm, notwithstanding that the soil was clay, but as the town grew, the farm began to get over-worked, and they came to the conclusion that they ought to clarify the sewage before putting it on the land. From experiments, which were carried out at Leicester for twelve months, they found that sewage could be clarified without chemicals. The question they then wanted to settle was, which was the best way to do it, whether by

open tanks, closed septic tanks, or aërobic beds. The resulting effluent was to go over a large area of pasture. They had been extremely successful in clarifying the sewage by the use of coarse grained aërobic beds, and then sending it on to pasture land. They had splendid effluents, and everything was going on well. His opinion was that the end of sewage farms had not arrived, but the farms could be used successfully in connection with biological treatment.

Bailie R. Anderson (Glasgow) said one point had been carefully avoided in the papers to which they had listened, and that was why the septic tank took no trade refuse or storm-water carrying road detritus. So far as the arrangement which he had seen at Exeter went, it was entirely for domestic sewage; also at Barrhead, where separate sewers had been laid for conveying the domestic sewage to the septic arrangement for the treatment of the sewage, and not, as he had been informed, for the whole refuse of the borough.

Mr. A. J. Martin: And storm-water.

Mr. J. Brierley (Southampton) said that what had been stated in regard to the absence of nitrates from the effluent brought to his mind the results of some analyses which he made ten or twelve years ago of samples of water taken from various points of the river Itchen. He found that there was a gradual increase of nitrates up to a certain point. At that point the water had to pass through a mill, and he there found that there was not only a considerable decrease of organic impurities, but also a considerable diminution of nitrates. It had struck him that the process of oxygenation to which the water was subjected on passing through the mill gave an increased activity to the aërobic microbes in the water, and led them to attack the nitrates. If that was the case, and the same thing happened in the filter-beds, when the quantity of nitrates was increased it would seem to show that the activity of the aërobic microbes was being lessened.

The President of the Section (Professor Percy Frankland), in a few general remarks, said the figures that had been given as to the capacity of the filter-beds corresponded very closely with what he had found himself. As to the disappearance of nitrogen, there had always been a general impression that the inter-action of the nitrites and ammonia salts affected the amount of total nitrogen ultimately found in the effluent. He had found that it did not injure the filter-beds to run storm-water through them. As to the most suitable materials for filter-beds, everyone had his fad. All were probably equally good, but much depended on the grain, and the way the beds were arranged; they could have all sorts of results from the same bed, according to the way in which they managed it, and that showed the advantage of having trained persons engaged in the work. A rumour had got abroad to the effect that the Massachusetts Board of Health had abandoned the biological treatment of sewage, but there was absolutely no foundation for that statement.

Mr. G. Thudichum (London) said, in reply to Mr. Anderson, that it was not necessary to exclude storm-water, as that gentleman had alleged.

Professor Bostock Hill (Birmingham) agreed with the last speaker. He also explained that he did not write his paper with the view of advocating the universal use of coal filter-beds. He had simply stated that he had obtained a certain result in a practical way, and he quite agreed with those who said that the choice of material was not the main thing.

"*Sewage Work in Massachusetts*," *by* Leonard P. Kinnicutt, D.Sc., F.A.A., F.C.S.

It is with great diffidence that I rise to occupy even a few moments of the time of this section, and I do so only because I find that there exists a very false idea regarding the position of the Massachusetts State Board of Health in respect to the biological treatment of sewage.

The President of this Section in his closing remarks yesterday referred to this, saying that there is a widespread belief that the Massachusetts State Board of Health had come to the opinion that the biological treatment of sewage was a failure, and that they advocated the building of large trunk sewers to carry the sewage of various cities of the State to the sea. This statement I have heard more than once during my present visit to England, though possibly never more forcibly expressed than when one of your members said to me yesterday, "So Massachusetts has chucked over the whole system of sewage purification."

How false is this idea, and how contrary to the real facts, I can best show by stating in a few words the work that has been done and is being done in Massachusetts, and this I consider a duty that I owe, not only to my own State, but also to the men in England whose work has modified the world's ideas regarding sewage purification.

Until the year 1888, the sanitary authorities in America had paid very little attention to the disposal of sewage, and there was not a single city in America, as far as I can recall, that attempted to purify its sewage before emptying it into the sea, or into the nearest river course. The question of river pollution

had, however, been brought more than once to the attention of our Legislature and Law Courts; and in 1888, the State of Massachusetts, believing that something should be done to protect our inland waters, passed an Act by which the State Board of Health was not only required to make examinations of inland waters for the purpose of ascertaining whether the same were adapted for use, or source of domestic supply, but were also authorized to conduct experiments to determine the best practical methods of purification of drainage and sewage, or disposal of the same. For this purpose, a grant of about £5,000 was voted, and this same amount has been voted each year, since that time, for the above-mentioned purposes.

The State Board of Health immediately began a series of experiments, at Laurence, on the purification of sewage, taking as their starting point the reports of the "English Rivers Pollution Committees," and, especially, the work of Dr. Frankland on intermittent filtration.

The first result of this work was the publication, in 1890, of two large volumes; the first, "Water Supplies and Inland Waters of Massachusetts"; the second, "The Purification of Sewage." This second volume contains the results of the experiments upon the purification of sewage which were made under the direction and continuous supervision of Mr. Hiram F. Mills, the Engineering Member of the Board; and it is to him, more than to any other man, that this report, which is well known to you all, was considered at that time as one of the most valuable contributions to the literature of sewage purification that had ever been published.

This report, I think, showed conclusively that domestic sewage could be purified, to an extent not before considered possible, by passing it intermittently on to sand beds drained at a depth of from 4 to 5 feet at the rate of about 100,000 gallons per day to the acre.

The work of the Board since that time, as is shown by their annual reports, not only confirms the opinions there stated, but each succeeding report has shown more and more conclusively that the biological treatment is the only advisable method for dealing with domestic sewage.

For whether you use the method adopted by Dibdin (to whom all praise and credit is due for first bringing the method of biological treatment to the serious attention and consideration of English sanitary chemists and engineers), or use the triple contact filters now being experimented with at Manchester, or use the Cameron septic tank before applying the sewage to the filters, or run the crude domestic sewage directly upon sand beds, thoroughly under-drained, as we do in Massa-

chusetts, you have in all these cases only different application of the same great principle.

The stand taken by the Massachusetts State Board of Health is most certainly that for inland cities with domestic sewage the only method of treatment is the biological one; and as a result of this stand the five cities of Massachusetts that during the past five years have been obliged to purify their sewage, have adopted this method, and it was only last summer that the State Board of Health not only advised the town of Clinton (a town of 12,000 inhabitants) to purify the sewage by biological treatment, but undertook for the State the whole charge of preparing the filters.

How the widespread opinion arose that the Massachusetts State Board of Health disapproved or had lost confidence in the biological treatment of sewage, I am at a loss to understand. Possibly it came from the fact that during the past three years a large trunk sewer, running in one direction about ten miles out of Boston, has been built and connected with the Boston sewage system. Into this trunk sewer a certain number of towns, which are in fact almost a part of Boston, have been allowed to empty their sewage and to discharge it with Boston sewage, at ebb tide, into Massachusetts Bay.

The reason for allowing these towns to be connected with the Boston sewer system is a local one, and need not be entered into here. It is only necessary to say that, so far as I know, there is no idea of letting any other towns connect with this system; and an investigation is to be made as to the amount of sewage emptied at the present time into Massachusetts Bay in the neighbourhood of Boston, which I believe will show that the limit has already been reached.

As to the best method for the purification of manufacturing sewage the State Board of Health has, as yet, given no decided opinion. If it contains only organic matter as brewery refuse, etc., experiments show, as Mr. Thudichum has stated, that it can be easily treated biologically. When the sewage contains iron liquor and free mineral acids our sanitary experts await the result of further experiments, and are following with the closest attention the experiments at Manchester and Leeds, and will read with great interest the paper of Dr. Hill on the use of the Cameron tank with such sewage.

One thing, however, with regard to the treatment of manufacturing sewage, we believe we have proved in America, by work on a large scale at Worcester (Massachusetts), and that is, that by chemical precipitation alone, even with the greatest care, and at an excessively high cost, a filtrate cannot be obtained sufficiently pure to turn into a water course unless

the minimum dry weather flow of that water course is at least ten times, and better fifteen times the average flow of the sewage.

If time permitted, I should like to describe the method employed in Massachusetts for purifiying sewage by sand filter beds, whereby we can only treat 100,000 gallons per day per acre; and why we do not follow the methods which Dibdin, Thudichum and others have shown worked most admirably, and whereby 500,000 gallons per acre per day can be treated. I do not feel that I have any right to so occupy your time, and I will only say that the reason is not because we do not believe in the work that is being done in England, but because local conditions as to soil and climate are very different from those in England, and we must wait the experiments made in our own country before advising the use of filters similar to those in Sutton.

Allow me, Mr. President, to thank you, and all the Members of this Section, not only for your kind attention, but for all the courtesy that I have received, during my various visits to England, from members of your profession.

Dr. S. Rideal (London) having pointed out that the Massachusetts Board of Health carried out their experiments on the lines set forth in the English River Pollution Report remarked that the general result of the previous day's meeting pretty well established the principle that an anaërobic preliminary treatment was an essential condition of success in sewage disposal. They were now obtaining the same results as were obtained by upward filtration twenty years ago. Then, however, it was not known that those results were due to bacteriological action, and now they realise that it was so. The comparative failure of the Massachusetts experiments years ago was due to the fact that further investigation on upward filtration was not prosecuted, as by it sewage was prepared for downward filtration, in which the final oxidation was effected. The conditions for successful working of aërated filters established by the Massachusetts experiments showed that by the combination of the two processes the sewage problem could be solved on biological lines.

Dr. Maclean Wilson (West Riding, Yorkshire) said he was glad to hear that the State Board of Massachusetts were still of opiniou that the biological method of sewage purification was the proper one. He had been much interested in the account which had been given of the work of the Massachusetts State Board of Health, and he would like to know whether in addition to advising towns as to

the best means of dealing with their sewage they were a supervising body, with power to compel the smaller authorities to deal with their sewage properly? He was pleased to hear that the subject of the treatment of manufacturing refuse was under consideration by the Massachusetts State Board. In the West Riding that was a burning question in regard to the pollution of streams. Some districts were agreeing to take trade refuse into their sewers, but others were holding back, and would not do it unless obliged. It was a question which must come to the front very shortly, and it was one in which, he believed, the Congress might eventually be able to assist the manufacturers very considerably.

Dr. L. P. KINNICUTT (Massachusetts) in reply, said that the State Board of Health had no real control over the local authorities. They were obliged when a town asked for advice to give it, but the town was not obliged to follow that advice. If the town committed a nuisance, and another town brought an injunction against it, the Board of Health would give its opinion as to the effluent.

Professor F. J. B. QUINLAN (Dublin) observed that if they raised the temperature from that of the atmosphere to something approximating to the heat of the body, they would facilitate the functions of the pathogenic organisms.

"*On the Behaviour of the Bacillus Typhosus in Sewage,*" *by* W. H. HORROCKS, M.B., B.Sc. (London), Assistant-Professor of Hygiene, Army Medical School, Netley.

THE conveyance of enteric fever by drinking water has for many years been a cardinal doctrine of modern hygiene, and after the discovery of the bacillus typhosus by Eberth and Gaffky, diligent search was made for this organism in water supplies suspected to have caused enteric fever. With the advance of our knowledge of the reactions of the bacillus typhosus and the discovery of organisms closely allied to it, we have gradually had to multiply the tests to which a suspected organism must be subjected, and now-a-days attach great importance to the sedimentation test with typhoid serum.

In 1898, Dr. Houston isolated from Thames mud four organisms which he called Bacillus Typhosus Simulans, *a*, *b*, *c*, and *d*. They all resembled the true bacillus typhosus in morphology and the appearance of their surface colonies; they

did not clot milk or produce gas in shake cultures, but the flagellæ only numbered from three to nine, and they all failed to sediment with typhoid serum. These four organisms appeared so closely related to the bacillus typhosus that the question at once arose as to whether the variations observed, especially in relation to the power of sedimentation, might not have been caused by prolonged existence in sewage-polluted water.

From this point of view I thought it would be interesting to study the behaviour of the bacillus typhosus in sewage under varying conditions. A recent culture of the bacillus typhosus isolated from the spleen of a fatal case of enteric fever, was obtained from Professor Wright, and gave the following re-actions:—

Morphology.—Long thin motile rods.

Surface Colonies on Gelatine.—Greyish white delicate films with a wavy outline and faint surface markings, the centre slightly more opaque than the margin.

Indol-reaction.—No indol was produced in peptone and salt solution after five days' incubation at 37° C.

Potato.—Transparent colourless growth.

Litmus Milk.—Incubated at 37° C. showed feeble acidity but no clot formed.

Shake Gelatine.—No gas formation.

Flagella.—About 10 disposed all round the bacillus.

Sedimentation.—Complete agglutination with typhoid serum in dilution of 1 in 40.

A specimen of sewage obtained from Yeovil was treated as follows:—

(*a*) Placed in sterile test-tubes and sterilised by heating to 65° C. for ten minutes on four successive days.

(*b*) Placed in test-tubes and sterilised in the auto-clave at 120° C. for fifteen minutes.

(*c*) Filtered through a Berkefeld bougie into sterile test-tubes.

All the test-tubes were inoculated with one loopful of a 48-hours growth of the bacillus typhosus, and then kept in the laboratory cupboard at a temperature which varied between 16° and 22° C.

The day following, one loopful was removed from each of the tubes and plated out in gelatine; after 72 hours' incubation at 22° C. all the plates were densely-crowded with colonies. Four days later a loopful was again removed and rubbed over an agar slope; after 24 hours at 37° C. a growth appeared covering nearly the whole surface. An emulsion in normal salt solution was then made from the agar growth, and sedi-

mentation tubes, according to Prof. Wright's method, were prepared with typhoid serum in dilutions of 1-20 and 1 in 40. Controls of the emulsion were made in the same dilutions with normal salt solution. Both the tubes prepared with typhoid serum were completely agglutinated in 24 hours, while the control tubes were unaffected.

Ten days after inoculation, a loopful was withdrawn and inoculated on agar; a growth resulted in 24 hours, which treated in the same way, agglutinated completely with typhoid serum in a dilution of 1 in 40.

At the end of three weeks the same results were obtained.

After two months, a loopful was removed and plated out in gelatine; very few colonies appeared and those which did grow, were black in color with granular contents, and the margin was only slightly wavy. In fact they appeared so unlike the original colonies that it was feared some pollution had occurred. However, one of the colonies was fished and inoculated on agar; after 24 hours a growth appeared which, when tested with typhoid serum, agglutinated completely in a dilution of 1 in 40. Besides the change in the appearance of the colonies, the bacillus typhosus appeared to have less resistance to carbolic acid, for while the original culture gave a copious growth in broth containing ·05 per cent. carbolic acid after 24 hours incubation at 37° C., the agar growth prepared from the discolored colonies showed no growth after 24 hours incubation at 37° C. in ·05 per cent. carbol. broth, but after 48 hours there was a slight loss of transparency, and after 72 hours there was a marked growth.

Experiments on the same lines were made with the same sewage in dilution of 1 in 10; identical results were obtained.

These experiments appeared to show that the bacillus typhosus will be found alive after 60 days' immersion in strong and diluted sewage containing its usual toxines and salts, but freed from other living organisms. The power of sedimentation will be unchanged, but the colonies may present a dark granular crumpled appearance and the bacillus will show diminished resistance to carbolic acid. This last fact appears to me important in relation to Parietti's test for the detection of the bacillus typhosus in water.

Having arrived at these conclusions, I thought it would be interesting to repeat the experiments on the same lines, but to add B. Coli to all the tubes after the inoculation of the B. Typhosus. A typical B. Coli was isolated from a normal stool and gave the following re-actions:—

Morphology.—Very short rods, feebly motile.

Surface Colony on Gelatine.—Greyish white film with a

transparent margin and irregular outline. The whole colony was thicker than the colony of B. Typhosus.

Shake Gelatine.—Abundant gas formation.

Litmus Milk.—Milk clotted and marked acid re-action after 24 hours, at 37° C.

Indol.—Marked indol re-action after three days at 37° C.

Potato—Yellowish brown slimy growth.

Flagella.—One to three, readily breaking off.

Sedimentation—No re-action with typhoid serum in dilutions of one in ten and upwards, but with serum obtained from a rabbit immunised with the same bacillus, complete agglutina-ion was readily obtained in dilutions up to 1 in 40.

Before adding this specimen of B. Coli to the tubes containing the bacillus typhosus, I thought it would be wise to see if any change occurred in its re-actions, after existence in sterile sewage. After immersion for 42 days in sewage filtered through a Berkefeld bougie, there was no difference in the sedimentation tests, but the colonies showed a tendency to grow out as very thin films with leaf-like projections strongly resembling the bacillus acidi lactici, the production of indol appeared to be delayed, and the bacillus seemed less resistant to carbolic acid, for whereas the original coli grew well in 0·2 °/₀ carbolic acid broth, after 24 hours' incubation at 37° C., the coli from the sewage showed no growth in 0·15 °/₀ carbol broth after 24 hours at 37° C., but grew well in 0·1 °/₀ carbol broth. The other re-actions of the bacillus however, appeared unchanged. A fresh 24 hours' culture of this B. Coli was now added to the test tubes containing the B. Typhosus innoculated 24 hours earlier.

After 14 days, loopfuls were removed and plated in Holtz's potato-gelatine, and rubbed over the surface of gelatine solidified in Petri dishes.

In the potato-gelatine plates colonies appeared which resembled the bacillus typhosus, but on fishing them and innoculating into glucose gelatine they all gave marked gas formation. The same result was obtained with the ordinary gelatine plates. Of course it was impossible to examine all the colonies, but on the ordinary gelatine most of the colonies were discrete, and being on the surface could easily be fished. A great many colonies were examined, but they all gave the reactions of the bacillus coli. The potato-gelatine method proved very disappointing. Many of the colonies which appeared like small clear drops of water, and should have been bacillus typhosus, proved to be the bacillus coli. The experiment was repeated again, but in a slightly different manner. A large loopful of a twenty-four hours' growth on agar of the bacillus typhosus was added to 10 cc. of sterile sewage, and incubated at 37° C. for 48 hours; the

sewage was then found quite opaque, and one loopful plated out in gelatine produced innumerable colonies of the bacillus typhosus. A very small quantity of an agar growth of bacillus coli was now introduced into the mixture of sewage and bacillus typhosus, and the tube kept at the laboratory temperature. At the end of five days the bacillus typhosus could still be isolated, and agglutinated well with typhoid serum.

It is well known that the bacillus typhosus will not grow well in a broth-culture of B. coli which has been filtered through a bougie, but tends to disappear. It is, however, interesting to note that the bacilli which do survive still retain their agglutinating action when mixed with typhoid serum.

Working on the same lines with a mixture of bacillus fluorescens liquefasciens and bacillus typhosus in sterilised sewage, I have not been able to isolate the bacillus typhosus after the 7th day; but when last isolated it agglutinated well with typhoid serum.

These experiments appear to show that prolonged immersion in sterile sewage does not destroy the agglutinating action of the bacillus typhosus with typhoid serum, and that though the presence of other organisms may cause its rapid disappearance in raw sewage, if the bacillus be found it will still retain its specific characteristics.

With regard to the value of the agglutination test as a means of diagnosis, I think that at present our knowledge warrants us in considering it of the first importance. When properly employed the test easily enables us to distinguish the bacillus typhosus from the bacillus sulcatus and the various forms of coli.

In the performance of the test, however, there are errors which it is important to guard against. In the first place it must be remembered that the normal serum of the horse (diluted from 1 in 30 to 1 in 50) has been found occasionally to have an agglutinating action with the bacillus typhosus. I tested the normal serum of one of the horses at Netley, but failed to discover any complete agglutinating action in a dilution above 1 in 10. Still, in making my experiments a dilution of at least 1 in 160 was always used so as to avoid this source of error. In the second place, when testing the bacillus coli and the bacillus fluorescens liquefasciens with serum from a normal and an immunised horse, I noticed that after 24 hours distinct sedimentation occurred in the capillary tubes. Yet when the tubes were opened and the sedimented portion examined in a hanging drop, no traces of clumping were observed in the case of the bacillus coli, and in the case of the bacillus fluorescens liquefasciens the clumps were small and made up of bacilli which, though ad-

hering together, still possessed sufficient mobility to cause the clumps as a whole to move in the field, contrasting very strongly with the motionless clumps of the bacillus typhosus. This false clumping may have been partially due to the sticky nature of the agar growth of the bacillus fluorescens liquefasciens, which would, perhaps, cause the bacilli to adhere together after they had been precipitated by the serum. Control tubes of the emulsions of the bacillus coli and bacillus fluorescens liquefasciens put up in dilutions of 1 in 10 did not show the slightest trace of sedimentation.

I have not found that typhoid serum completely sedimented the bacillus typhosus without at the same time producing distinct agglutination. Still, when using a typhoid serum as a means of diagnosis of a bacillus, it appears to me that we are hardly justified in considering the sedimentation produced by the slow method in capillary tubes as necessarily indicating agglutination. The macroscopic appearances should always be checked by a careful microscopic examination.

[*For discussion on this paper see page* 671.]

"*The Tubercle Bacillus as a Saprophyte*," *by* ARTHUR RANSOME, M.D., F.R.S.

As an outcome of some of his earliest researches, Dr. Koch pronounced the tubercle bacillus to be a true parasite, which can only originate in an animal organism.

In a paper, "The Etiology of Tuberculosis," published in 1884, he emphasized this conclusion, on the grounds that "experience has shown that tubercle-bacilli grow much more slowly than any other bacteria, further that they grow only in serum and meat infusion, and most important of all, require a temperature of 30° C. to grow at all." He repeats "they are therefore true parasites which cannot live without their host."

It was not long before this conclusion was challenged by Mr. Candler, of Melbourne, mainly on the ground of insufficient proof ("The Prevention of Consumption"), and shortly afterwards several bacteriologists, foremost among whom were Sir Hugh Beevor, the late Prof. Kanthack, and Prof. Delépine, succeeded in cultivating the organism, not only on a variety of purely vegetable substances, but even at temperatures much below that of the animal body, 15° C. and under.

I have myself been able to grow the bacillus at ordinary

temperatures, and have obtained abundant colonies on such simple media as pure filter paper, common wall paper, and potato, moistened with watery fluids obtained by condensing the vapours from human breath, from ground air, and from weaving sheds.

It is still a question whether these non-parasitic cultures retain sufficient virulence to give the disease to animals, but apart from direct evidence, I think that there are several considerations which point to the conclusion that they are a source of danger in this respect.

In the first place, it is certain that tuberculous sputum retains its vitality and its virulence, for very long periods of time, when exposed in low-lying, badly-drained dwellings, inhabited by a densely packed population, and that it rapidly loses its power in well-lighted, well-drained houses, placed on a dry, porous subsoil.

I venture to refer to some experiments on this point, made in collaboration with Professor Dreschfeld, of Manchester, and reported in the Proceedings of the Royal Society (Vol. XLIX., p. 66).

I have further proved, by an inquiry into the incidence of tubercular disease in certain parts of Manchester and Salford, that the complaint clings to infected houses situated in these districts. (Trans. of Epid. Soc. of London, Vol. VI., N.S.)

Dr. Flick, of Philadelphia, also showed that phthisis has a special affinity for particular groups of houses, in which it keeps recurring: and Dr. Niven found the same distribution of the disease in Oldham. More recently the Public Health Department in the city of New York has plotted out the cases occurring on a series of maps, and it is thus seen that houses are affected in blocks, and are passed over in blocks. In fact, it looks as if one house affected another, rather than that one person affected another.

It seems probable from these results that these unhealthy houses contained something which is at least favourable to the existence of the microbe, and that this material sufficed both to nourish it and facilitate its growth.

The special experiments which I have already mentioned show that the condensed organic vapours commonly found in such houses form admirable cultivating media for the growth of the bacillus.

I venture to think that these facts prove that the bacillus of tubercle is not merely a parasite, but that it can live upon material outside the body, and they point to the probable nature of this material.

In any case there can be no doubt that the organism

can nourish itself, at ordinary temperatures, upon substances commonly met with in dwellings; upon the aqueous vapour contained in the breath of human beings, or proceeding from the soil.

To this extent, therefore, the bacillus of tubercle is a "saprophyte."

Some other researches, carried out in 1894, in collaboration with Prof. Delépine, (Proc. R. S. Vol. LVI.) still further explain the immunity of certain houses, and infection in others; and indicate other sources of danger in unwholesome dwellings. In these researches we were able to prove that the virulence of tuberculous sputum is rapidly destroyed by exposure to pure air and sunlight; so rapidly that it has not time to dry up, and crumble into dust, before it has entirely lost its virulence.

The practical lessons to be learnt from these several series of facts are, I venture to think, (1) that local authorities must seek out all the phthisis-nests in their districts, and either purify them effectually, or destroy them. (2) That they must wage war against over-crowding and imperfect ventilation of dwellings, workshops, and places of public assembly. (3) That they must carefully carry out subsoil drainage, and must insist upon concrete basements, and damp-courses in all buildings.

These measures are of no less importance than the disinfection of sputum, or the segregation of careless people in Sanatoria, or even than the formation of herds of tubercle-free cattle. All this should be done, but the other general sanitary work should not be left undone.

[*This discussion applies to the papers by* W. H. Horrocks and Dr. Arthur Ransome.]

Dr. A. Angell (Southampton) said he thought the moment had arrived when it would be somewhat useful to throw a little heterodoxy into the consideration of the subject of micro-organisms. As a "Naturalist" he felt in great difficulty in his own mind to believe that there was such a thing as a pathogenic germ, *i.e.*, a pathogenic germ *ab initio*. He believed that germs were pathogenised by the dirty conditions under which they were very frequently caused to grow and work. Of course there could be generic differences, they could see differences in many directions. They had to admit that man was the dirtiest of all the animals, and creatures which men call domestic animals, he had made dirty to suit his objects. He cited the pig as an instance of this, and went on to refer to the outbreak in Dawson city, suggesting that it was far more likely that the

bacillus of typhus was manufactured there by the social conditions which existed, than that it was carried there. Nearly all the papers which had been read at the Congress indicated that he was right in so thinking, and the biologist ought to search for the conditions under which the ordinary germs became pathogenised or changed from their normal state into one which is abnormal, rather than to make fruitless efforts to discover specific disease germs.

SIR JOSEPH EWART asked whether Dr. Ransome's experiments had proved that the tubercle bacilli, which were non-virulent, would take on virulence if passed through the body of an animal?

Dr. A. RANSOME (Bournemouth) replied that although they had no direct proof that non-pathogenous germs became pathogenised, yet he thought most of the pathogenic organisms must have originated in another form, and become pathogenised by environment. That was merely an expression of opinion, he had no proof, and did not know that anyone else had obtained proof that virulent bacilli, cultivated on various organic media, at ordinary temperature, remained virulent. It was exceedingly difficult to answer the other question as to whether these cultivations would become virulent if they could make them pass through some small animal, either with the specified disease or in some other way, but the fact that they had not managed to make these cultivations produce tubercle, made the question difficult. The important thing was to recognise tubercle as a "filth-disease," whether truly saprophytic or not. All the means that medical officers had been accustomed to put in force in order to do away with filth, could be adopted with express reference to tubercular disease.

"*Methods employed for Generating Formaldehyde for Disinfecting purposes,*" *by* SAMUEL RIDEAL, D.Sc.Lond., F.I.C.

(FELLOW.)

DR. S. RIDEAL gave a demonstration on the various methods. He pointed out that since the first experiments in this country on the use of formaldehyde as a disinfectant, conducted by Dr. Slater and himself in 1894, and published in the *Lancet* of that year, manufacturers had placed upon the market a variety of forms of apparatus by which formaldehyde gas could be generated. At that date, the 40 per cent. solution of

formaldehyde, now known as Formalin, had just been introduced into England, and his first experiments were carried out by evaporating this solution in an open dish. By this method of generating the gas, a considerable quantity of solid paraformaldehyde is produced, and its amount varies with the size of the dish and rate of evaporation, so that no reliable quantity of the gas can be obtained. After that date, very little progress was made in this country, but in France and Germany lamps were devised for generating formaldehyde directly from methyl alcohol, whilst the solution of the gas was used in the form of spray. Amongst the methyl alcohol lamps, the most recent is known under the name of "Formogène Richard," and it resembles the lamps used by Dr. Kenwood, and describe before the Institute two years ago. It seems, however, difficult to insure the conversion of the whole of the methyl alcohol into aldehyde, and the cost of the spirit is, therefore, somewhat high, as two quarts of the spirit, costing about 10s. a gallon, is required for each charge. The Formogène Richard lamp has yielded good results in the hands of the late Dr. Kanthack, and Dr. Kenwood shewed that when a very large quantity of methyl alcohol is used his lamp gave good results. The difficulties attending the direct production of formaldehyde from methyl alcohol in situ has led other investigators to endeavour to overcome the difficulty of preventing the production of paraformaldehyde when using the formaldehyde solution. In America, the Chicago Board of Health have devised a special spray producer (Dr. Behm), and have, therefore, given up all attempts at using lamps. The Massachusetts State Board use a kind of autoclave, and this apparatus is now in use by many of the Boards of Health in the States, and, under the name of the Sanitary Formaldehyde Regenerator, has recently been introduced into this country. It resembles very closely the autoclave designed in France and known as Trillat's. In this machine, however, the formaldehyde solution is first mixed with calcium chloride solution, which is meant to facilitate the retention of the water when the gas is generated. It would seem, from my own experiments, that formaldehyde acts as a disinfectant in presence of some water vapour, and, therefore, care must be taken not to generate the gas too dry, whilst, on the other hand, thorough penetration seems to be retarded when too much water is present. In Germany, Walther and Schlossmann have experimented with glycerine, with a view to preventing the polymerisation which takes place when formaldehyde solution is heated alone, and for insuring a sufficient quantity of water vapour in the formaldehyde gas. This apparatus is known as Dr. Lingner's

disinfecting apparatus, and is made in Dresden. The apparatus consists essentially of a boiler which generates steam sufficient to vaporise the glycerine and formaldehyde solution. More recently, lime has been suggested for insuring the proper evolution of the formaldehyde from its solution, and in experiments with this dehydrating agent I have obtained, however, only 8 per cent. of the theoretical yield, so that the heat evolved by the union of the lime with the water was sufficient to polymerise a large quantity of the gas. Fused calcium chloride and concentrated sulphuric acid also gave very little gas. When lime is added to the formaldehyde solution, calcium formate is produced, and probably, therefore, some methyl alcohol, according to the equation:—

$$2\,CH_2O + H_2O = CH_3OH + H.COOH$$

I am, at present, continuing these experiments in the hope of obtaining a better yield of formaldehyde.

The third method of generating formaldehyde for disinfecting purposes is to start with paraformaldehyde, and reconvert it into gas by heating it in the presence of water vapour. Schering, in Berlin, devised lamps for this purpose, and in England, the "Alformant" lamps have been put on the market. All these lamps rely upon the water obtained in the combustion of the spirit used for heating the solid paraform, as it is called, for supplying the necessary amount of water; but the German lamps will not burn the methylated spirit of this country, and the English lamps seem to give with methylated spirit somewhat too small a quantity of aqueous vapour for the best results. Quite recently, this defect has been remedied in what is called the Hydroformant lamp, in which an annular vessel holding 12 ozs. of water is fixed, and this water is converted into steam at the same time as the tablets are gasified. A somewhat more cumbersome apparatus known as Flugge's embodies the same idea, and is used largely in Germany. In connection with this apparatus, a second ammonia generator is employed, which is used for passing ammonia into the room seven or eight hours after the development of the formaldehyde, the ammonia combining with the formaldehyde to form trioxymethylene diamine, which is free from odour before the room is opened. A further method of utilizing paraformaldehyde is now under trial, but my experiments are not yet completed. It is based upon the fact that lime when added to the paraformaldehyde, and water added, causes a rapid liberation of formaldehyde gas, and if this method is successful, the apparatus required will be much simplified.

Dr. CHARLES PORTER (Stockport) said this section was much indebted to Dr. Rideal for the very interesting practical demonstration he had given them of a comparatively new method of disinfection. The latest report of the Maine State Board of Health included a detailed and valuable report by Professor Robinson on formaldehyde as a disinfectant. Professor Robinson stated that it had been exhaustively tested in laboratories all over the world, and found to possess powerful disinfecting properties. He, however, qualified his recommendation with the limitation that formaldehyde, on account of its low penetrative power, should not be used where it was possible to employ steam. A practical drawback to formaldehyde was its cost. Dr. Kenwood stated at Edinburgh last year that the vaporisation of twenty paraform tabloids per thousand cubic feet was necessary to ensure efficient disinfection, and these cost between 7d. and 8d. On the other hand, sufficient chlorinated lime or corrosive sublimate solution for the same work would only cost about one penny. In Stockport the use of formaldehyde has been confined to the disinfection of such goods—*e.g.*, books, boots, etc.—as were likely to be injured by steam. The goods, together with an Alformant "A" lamp containing five tabloids, were placed in the chest of a "Nottingham" steam disinfector, the capacity of which is about 200 cubic feet. The chest was closed, the tabloids vaporised, and the result, as far as one could judge, was satisfactory. He noticed recently in a greenhouse that, with the object of killing blight, the gardener was vaporising nicotine in a cheap and handy apparatus which struck him as being equally well adapted to vaporise formaldehyde. He suggested that the disinfecting properties of nicotine might with advantage engage the attention of bacteriologists. He would like to mention that Professor Robinson had constructed of oiled and painted canvas an excellent airtight portable disinfecting chamber, with the necessary arrangements for admitting formaldehyde into it, and this had been used with great advantage where no other kind of chamber was available.

Dr. SYMONS (Bath) said he had used formaldehyde in the same way as Dr. Porter, viz., in a steam disinfector. He caused from three to six ounces of formalin, either as a fine spray or in the crude liquid form, followed by two ounces of water, to pass into the chamber from which about two-thirds of the air had been exhausted. The spray was followed by air until normal pressure was reached. The tap through which the fluids had been admitted was then closed, and the goods allowed to remain exposed to the formalin for at least one hour; after this, another partial vacuum was made, and about one ounce of solution of ammonia was allowed to enter the chamber, and the vacuum again broken and the goods removed. In other respects the details of the process were the same as for disinfecting by dry heat. He had seen no evidence of the formation of paraformaldehyde, but doubtless formaldehyde was more trustworthy as a disinfectant when used as a weak solution in water than when attempts

were made to use it as a gas. The capacity of his disinfecting chamber was about seventy cubic feet.

Dr. F. J. ALLAN (London) said he had used this form of disinfectant for the past two years. He had made a considerable number of experiments with the Alformant lamp, and was well satisfied with it. It must be clearly understood that it was only a surface disinfectant, and ought not to be relied upon for disinfecting bedding and such things unless certain conditions were complied with. These were a closed chamber, a partial vacuum, and a temperature of 110° Fahr. For the ordinary disinfection of rooms after removal of bedding, etc., the gas should be used in the proportion of not less than one per cent. per volume, the exposure to be not less than two hours, and the temperature to be not less than 52° Fahr.

Dr. W. C. C. PAKES (London) added that it must not be imagined that an organism merely had to smell formaldehyde and die. Some experiments which he had made showed that one could not be certain that the organisms were really killed under seventy-two hours' exposure to the vapour. Formaldehyde had fallen into bad odour with some people because they did not recognise the fact that, like every other disinfectant, it required time to do its work.

"*Discussion—Food Preservatives*," *by* SAMUEL RIDEAL, D.Sc.Lond., F.I.C.

(FELLOW.)

DR. RIDEAL, in opening a discussion on "The Use of Food Preservatives," referred to a paper by Dr. Foulerton and himself, published in the May number of *Public Health*, in which, after a long investigation, they had come to the conclusion that a mixture of boric acid and borax of one in 2,000 (four grains per pint), or formaldehyde one in 50,000, was sufficient to keep milk sweet for twenty-four hours, even in warm weather; while the use of the preservatives in these quantities appeared to have no appreciative effect upon digestion. It is true that these quantities show some slight retardation when the examination is made before the digestion is completed, that is, after equal times, but it would seem that a little longer time would enable the preserved food to be as completely digested as the unpreserved food. It is also important to recollect that both preservatives have practically no effect upon the digestion of casein, and therefore, in a milk diet, their effect is less marked than when the preservatives are used

with meat or starchy foods. The following experiments show that the influence of the preservative is comparable to that of condiments, or alcohol or tea, upon starch digestion:—

Breadcrumb, 5 c.c., with 50 c.c. Water exposed to Action of Ferment for Half an Hour.

	ZYMINE.	SALIVA.
	Maltose produced.	
1. Nothing added	0·5395 = 100	0·707 = 100
2. Formic aldehyde, 1 in 50,000	0·477 = 88·5	0·672 = 95
3. Boric acid, 1 in 2,000 ...	0·423 = 78·5	0·607 = 86
4. Malt vinegar, $2\frac{1}{2}$ c.c. ...	0·258 = 48	0·1647 = 23
5. Salt, 0·2 gramme	0·52 = 97	0·70 = 99
6. Worcester sauce, 1 c.c. ...	0·5 = 93	0·57 = 82
7. Alcohol, 5 per cent. (claret and water, 25 c.c. of each)	0·47 = 88	0·701 = 99
8. Tea, $\frac{1}{3}$ gramme infused in 50 c.c. of water... ...	0·491 91	0·650 92

In the pancreatic digestion of casein, no difference could be observed in the amount of casein digested with and without formaldehyde, whereas an addition of a small quantity of infused tea, claret, or Worcester sauce to the milk reduced the amount of digested casein to a small but noticeable extent. The conclusion is that the small amount of preservative has actually less effect than these ordinary additions to food. The Author stated that he was strongly of opinion that the presence of any foreign addition to milk should be declared, and that in such declared milk any amount of boric acid or formaldehyde in excess of the limits mentioned above would be foreign additions to such declared milk, which no vendor could put forward as necessary preservatives.

He further pointed out that recorded cases of the toxic effect of boric acid showed that fifteen grains a day may, in a a fortnight, produce skin eruption in susceptible individuals (adults), so that this quantity must be regarded as the maximum amount per day which may be safely taken by an adult. An invalid with a hospital milk diet could possibly take as much as twelve grains per day—that is, in three pints—so that the toxic limits would be very nearly reached in such a case; whilst a child aged six months might take as much as thirty-two ounces of cow's milk per day, or about six grains per day; and this quantity, in relation to the body-weight, approximates to the amount which, in some individuals, has produced injurious effects.

Mr. W. W. FISHER (Oxford) said he did not wish to express any dogmatic opinion upon this subject. As public analysts, they were dependent upon the information which they were able to obtain from their medical friends. At the present time, they were in a difficulty. They were obliged to accept food preservatives in some cases. No one had yet attempted to stop the addition of boracic acid to milk, except in cases of excess. His Authority once instituted a prosecution in respect to the addition of salicylic acid to British wine, but the proceedings failed. There was abundant evidence of the great advantages resulting from the preservation of articles of food, and the only thing they had to do was to take care that the method of preserving should not be open to objection. Dr. Rideal had done good service by the excellent experiments which he made; but he had not been able to accomplish enough to settle this question, and he should be glad if any gentleman who had any special information would communicate with the Society of Public Analysts, or lay it before the Departmental Committee.

Dr. H. HANDFORD (Nottingham) said the question of the addition of boracic acid to milk had been an important one in Nottingham. With regard to the experiments, the result of which had been placed before them, he did not for one moment wish to contest the accuracy of them; but he thought Dr. Rideal would go with him in saying that human beings do not resemble each other so closely as do the glasses in a laboratory. It was a great fallacy to translate at once the results of experiments made in the glasses of a laboratory to human beings of varying age, habits and constitutions; and that had been pointed out so many times that it seemed hardly necessary to allude to it again. He had had no experience of the results of adding boracic acid to milk to the extent of 1 in 2,000; but when in the Nottingham General Hospital there was trouble amongst the patients whose diet largely consisted of milk, enquiries were made which resulted in the discovery that a common procedure among milk sellers was to put a tea-spoon full of boracic acid to a gallon. That would be about 60 grains to the gallon, so that babies from three months to nine months old, taking about two pints of milk per day, would be receiving about 15 grains of boracic acid in twenty-four hours, and it was not conceivable that anyone would recommend the use of preservatives on that scale. When boracic acid was omitted from the milk, diarrhœa amongst those children ceased. It was then stipulated that for the future no preservatives whatever should be added to the milk supplied to the hospital. The milkman agreed to that, and there has been no difficulty since. It was not simply a question of *delaying digestion*. To a large number of persons, boracic acid was an irritant poison.

Dr. ALFRED HILL (Birmingham) remarked that Dr. Rideal had said that formaldehyde should be used in very small quantities, and not for the purpose of keeping milk longer than twenty-four hours;

but there was no difficulty in keeping milk for that period without the use of any preservatives at all; and the fact was that the use of these preservatives simply encouraged dairy people to be unclean in their methods of milking and other operations. He was sure Dr. Rideal would not justify a process by which so much filth was introduced into food. Dr. Rideal said he would limit the proportion of boracic acid to 1 in 2,000, but he, the speaker, had found twice that amount, and even three times as much. It was within his knowledge that these preservatives were often present in milk which nevertheless was sour on receipt, and thus they had a double difficulty to deal with, the lactic acid produced by decomposition plus the acid put in by the milkman. Dr. Rideal gave his case away when he said that the amount of the preservatives must be strictly limited. How were they going to limit it? There were cases known in which the preservatives had been added by the dairyman, then by the purveyor, and finally by the consumer, and very ill effects had been consequently produced. Milk and butter could be kept sufficiently long to deal with in the proper way without the addition of any preservative, and why should the public submit to an addition by people who choose to make it in order to shield their own carelessness or dirtiness? Butter is actually imported from Australia and placed fresh upon English tables without a particle of preservative in it. In New York State the Americans had forbidden, by special Act, the use of preservatives, and regarded any addition whatever to milk as a breach of the law; and England should take a leaf out of their book. There was no justification for the use of preservatives of the kind under discussion, and this is clearly proved by the fact that only nine per cent. of the samples of milk submitted to him for analysis contained a preservative. Preservatives had been proved by experiments, both outside and inside the body, to be inhibitive of certain digestive functions, so that their injuriousness does not admit of doubt. They should not, therefore, be permitted till the question had been thoroughly investigated, and their harmlessness proved. In the meantime the process of refrigeration was proved to be in every way unobjectionable as not affecting the milk either by addition or subtraction, whilst it is indisputable that it is more efficient for preservation than any chemical substance yet used.

Dr. L. P. Kinnicutt (Massachusetts) said that, no doubt, within certain limits these preservatives were harmless, but the question was whether it was advisable for the dairyman to add them, and whether it ought to be allowed. For his part, he thought the law of Massachusetts which forbad the addition of anything to milk, and in the case of butter permitted only the addition of a little colouring matter, was a wise one. At the same time, he thought Dr. Rideal's paper a valuable one.

Professor Bostock Hill (Birmingham) said that those who were opposed to the introduction of chemical preservatives to milk were

indebted to Dr. Rideal for the experiments he had made. He thought that from the medical point of view the results were very strong indeed in condemnation of the use of preservatives. They showed that the addition of very small quantities of formaldehyde to milk caused retardation of digestion, which meant that it placed a percentage of extra work upon the stomach. Surely, preservatives which were dangerous to young children should be kept out of milk. If they were to have preservatives added to food, they should be distinctly informed what foods contained them, then those who believed that the addition of preservatives was harmful and unecessary could protect themselves.

Mr. PRINCE (Connah's Quay) said that to put the thing in practical shape he would like to ask Dr. Rideal how much boracic acid he would allow in a pound of butter and not consider excessive. Would he consider 7 grains per cent. to be excessive.

Dr. RIDEAL (London) replied that he should consider it very excessive. Most of the speakers, he remarked, had adopted an opposite view to his own, but it seemed to have been forgotten that he had not advocated the use of preservatives. What he had argued was that the preservatives in the quantities he had ventured to say were sufficient for preserving, had not been proved to have injurious effects. He agreed that a large quantity would undoubtedly be injurious to health, and also that it was possible, in many instances, to do without preservatives, and it was for the Departmental Committee to consider whether there should be some legalised limit. As to the effect of the addition of formaldehyde to milk for young children, he had given milk containing formaldehyde to his own children, in preference to sterilized milk. It had not been proved that sterilized milk was good for children under two years of age. There was no milk that did not contain some foreign substance, and it might be that a certain quantity of one of these powerful preservatives, whilst not sufficient to have any appreciable effect upon digestion, might have an effect upon the organisms in the milk, which would give a better guarantee of safety that one could have when drinking natural milk contaminated with such organisms.

LECTURES TO SANITARY OFFICERS.

THE SANITARY INSPECTOR IN RELATION TO THE PUBLIC HEALTH SERVICE.

BY SIR RICHARD THORNE THORNE, K.C.B., M.B., F.R.C.P., F.R.S.,
(FELLOW.)

Delivered November 13th, 1889.

ABSTRACT.

THE lecturer commenced by stating that his object was to impress upon those who are about to enter on the sanitary service of the country, in the official position of Sanitary Inspector, the importance of the duties which attach to that office, and the extreme value which is certain to be the outcome of their intelligent performance. In all callings certain duties can be performed in a perfunctory way, and doubtless some good might occasionally result; but real satisfaction in a life spent for the benefit of one's fellow citizens can only result from a proper apprehension of the significance of the duties which go to make up that life's work, and of the ultimate aim which is held in view. He had no intention of dealing with the several duties of the Sanitary Inspector in detail; he proposed, rather, by reference to one and another of those duties in relation to disease in the human subject, to give some indication of the real importance of the work the Sanitary Inspector would have to do, provided the doing of it went hand-in-hand with the acquirement of knowledge as to its object and the results to be expected of it.

The lecturer then proceeded to take the subject of tuberculosis as a basis of his remarks; dividing the subject into three divisions, namely, tuberculosis in all its forms; tuberculosis as most commonly received into the system from the air, of which phthisis was the type; and tuberculosis as mainly received by food through the medium of the alimentary canal. After explaining generally the relation of the tubercle bacillus to tuberculosis in its various forms, he pointed to some enormous reductions in the mortality from tuberculosis in England and Wales. Thus, by the aid of diagrams he showed that whereas tuberculosis in all its forms caused a death-rate of 3,483 per million living at all ages in 1851–60, the rate for 1891–95 was only 2,122, or a reduction of 39·1 per cent.; and he further pointed out that the reduction at ages varying from 10 to 35

years of age had been as high as from 44 to 53 per cent. Taking phthisis, it was shown by means of diagrammatic tables that the corresponding reductions had been even greater. At all ages it reached 45·4 per cent.; and at certain age-periods when life was most remunerative and most valuable to the State there had been reductions ranging from 57 to over 60 per cent. In other words, more than half the lives formerly sacrificed to this disease had been saved.

Turning next to the duties of the Sanitary Inspector he indicated that this great result had not been achieved by any knowledge of the tubercle bacillus—which had not then been discovered—but by the application of sound principles, worked out by careful investigation, to the every-day work of the sanitary officials. Thus, having given statistical data showing the influence, on phthisis mortality, of living in a damp subsoil, he discussed in some detail the work of the Sanitary Inspector as regards such matters as damp-courses, the provision of a few inches of concrete over the surface on which dwellings stood, rain-gutters, flooring raised above the damp earth, and other allied provisions which aimed at the avoidance of damp within and around the dwelling. He next gave an account of the destructive influence of movement of air and light upon the tubercle bacillus; and applying this to the work of the Sanitary Inspector, he discussed the valuable influence of open space in front and to the rear of dwellings, and the provision of windows to open on every floor, so as to secure free movement of air within the dwelling, and free access of light to all parts of every room. These matters were illustrated by large diagrams showing the various points to which reference had been made; and it was pointed out that if the principles inculcated were borne in mind, the work of the Sanitary Inspector would not be a mere dull observance of certain specified duties, but the intelligent performance of a work that would end in the saving of many a life from misery, and the diminution of death from preventable causes. There was still full room for such work, since, notwithstanding the saving of life already effected, some 60,000 lives were still annually sacrificed to tuberculosis in England and Wales.

Coming next to the reception of the specific organism of tuberculosis through the alimentary canal, he referred to the amount of tuberculosis in the bovine race, which had gone hand-in-hand with the artificial production of milk under which cows are kept in cowsheds instead of leaving them, as Nature had designed, to graze in the open air. He quoted a number of statistics recently put forward by Professor Axe, of the Royal Veterinary College, in which it was shown that the

testing of a number of herds of cows, &c., for tuberculosis led to the discovery of 90·9 per cent. as tuberculous where the cows "continue in confinement night and day," down to an utter absence of tuberculosis in any single cow of a herd which "led a purely outdoor life night and day, summer and winter." And, speaking of the present movement for the "open-air *treatment*" of tuberculosis, he urged, as regards the milch cow, that our duty was to secure the "open-air *prevention*" of the disease. Applying these principles to the current duties of the Sanitary Inspector, he referred to the inspectorial duties under the Dairies and Cowsheds Order, which he explained in some detail; and he pointed out, as worthy of notice, the new departure of the Local Government Board in dividing cowsheds, for the purposes of restriction, into two groups, namely, those in which cows were "habitually grazed," and those in which they were habitually kept in sheds. The evils of the latter system were explained, as was also the danger of the extension of tuberculosis to the udder, which at once rendered the milk infectious in the extreme if used in the raw state. This point was enforced by reference to a diagram showing a section across a tuberculous udder, in which the tubercle bacilli could be seen lying in and about the milk ducts ready to be washed down into the milk-pail.

In closing his lecture, Sir Richard Thorne addressed the following words to his audience:

I will now ask permission to say a few words on a point which I believe to be of real importance, namely, on the proper position of the Medical Officer of Health and of the Sanitary Inspector in relation to the public health service. I do so because occasions have arisen when the Sanitary Inspector has made claims which he is not entitled to make; has assumed to be an authority on subjects which are outside his province; and, in this way, has sought to overstep the proper boundary between the duties and responsibilities attaching to these two public offices respectively.

I can best illustrate my point by reference to a proposal which was made, so to modify a section of the Public Health (Scotland) Bill in 1897, as to give to the Sanitary Inspector the statutory right to decide what constitutes and what does not constitute danger to health.

The proposed modification, as is well known, was largely supported by the efforts of an Association of Sanitary Inspectors, who did their best to secure its adoption by Parliament.

Briefly stated, the question thus raised is as follows: Do the education and the training of the Sanitary Inspector justify his

being placed in a position to determine, for administrative purposes, what are the conditions which involve, or which do not involve, departure from a state of health in respect of such persons as are exposed to them?

There are few questions concerned with public health and preventive medicine which are more profound, or which involve for their elucidation a much wider scientific training, than is the case with this question. In order to judge of departure from health it is, in the first instance, necessary to know what constitutes health, and this in turn necessitates a knowledge of the healthy functions of the various organs of the human body and of the body as a whole. Such knowledge involves the study of physiology, chemistry, pathology, and of nearly all the branches of medical study, which occupy from six to ten years from the date of the preliminary examination to the date of final qualification; the longer term being by no means infrequent where a University degree and a Diploma in Public Health are in question.

Hence the answer of every person who is capable of weighing the matter at issue, and who possesses an adequate knowledge of the subject, must be that the training and examination of the certified Sanitary Inspector were never intended to confer this function upon him; and, as regards the non-certified Inspectors, the same must apply even more forcibly.

[illegible] Sanitary Authority is compelled to [illegible] as well as a Sanitary In- [illegible] as an indication that this very [illegible] line between the two [illegible]

[illegible] weakness of a cause more completely [illegible] arguments by which it is found [illegible] and if we apply this axiom to the [illegible] connexion with the Public Health [illegible] it will at once be seen that no cause [illegible] unscientific or flimsy grounds. [illegible] Sanitary Inspector, who took a lead in this matter, [illegible] services of the medical officer were only [illegible] necessary to certify the effect [illegible] upon the health of human beings, or [illegible] in a court of law."

[illegible] the judgement of the Sanitary Inspector in [illegible] of so little value that he is not deemed [illegible] And again, the Sanitary Inspector [illegible] competent under statute to form a judgement [illegible] was to be taken, but on the condition that he [illegible] have to prove his competency to form this judge-

ment under the ordeal of a cross-examination. Should any such test of his fitness arise, then he was to be allowed to retire, and the medical officer of health—who would have the right, by reason of his training and qualifications, to speak authoritatively on the subject—was to make good the inability of the Inspector to show that he possessed the knowledge necessary to the opinion he had given. Could any proposal be more puerile, or more fatal to the claim put forward? It might as well be contended that a man's word was always to be accepted as "the truth and the whole truth," subject to the condition that he was never to be put to the test of proving that he was capable of judging as to what constituted truth.

But listen to another of the Sanitary Inspectors who took an active part in the controversy regarding the Bill embodying the Scotch proposal. "I know personally," says this official, "Sanitary Inspectors who through experience are very much better qualified to examine and certify cases of infectious disease than medical men are, who perhaps have seldom had a chance of seeing these cases. . . ." Precisely the same claim which underlies this astounding statement might be far better made by many an old woman who, in the kindness of her heart, has often watched and dozed alternately by the bedside of the sick. Anyhow, I may say that this utterance sufficed to give the *coup de grâce* to some of the support which had up to that date been accorded to the proposal by persons who had been thus far ignorant of the claims which underlay it. It also called attention to the proceedings which were being carried on, proceedings which were utterly subversive of the principles on which the Public Health and Sanitary Services of the United Kingdom have always been based.

One result of claims such as these was that the matter was brought under the notice of the General Medical Council, who at once addressed the proper representatives of the Government, expressing the "grave apprehension" with which they viewed "the proposal to place the opinion of the Sanitary Inspector, in matters where a judgement has to be formed as to what is or is not liable to constitute a danger to public health, on a statutory equality with that of the Medical Officer of Health." The General Medical Council went on to recall the fact that the Legislature now required, as regards a large number of public health appointments, that Medical Officers of Health shall "give definite evidence of the possession of special acquirements," beyond their medical qualifications, "fitting them for their public health duties"; and they added that if the opinion of

another class of officers, who were necessarily "without the requisite technical and professional training, is to be placed on a similar footing to that of medical officers of health, the efforts made to ensure a distinctively high standard of proficiency in the Public Health Service will be seriously frustrated."

The outcome of this was that the reference to the Sanitary Inspector's claim was altogether disregarded before the Bill was passed into law.

No one who has listened to me this evening can for one moment imagine that I want to belittle the duties of the Sanitary Inspector. My object in addressing you has been to indicate to you, by illustrations taken from every-day practice, that underlying every performance of those duties are great and important principles; and that it is only by an intelligent, and often a technical, apprehension of these principles that you can have the satisfaction of knowing that your work is tending to the well-being of the public, and to the removal of those conditions which make life a burden, and but too often end in preventable disease and premature death.

There is plenty of room for both the Sanitary Inspector and the Medical Officer of Health to add to their knowledge and to enhance the value of their callings; but to this end each officer should be prepared to recognise that the one must needs possess, by the nature of his training, some knowledge which the other does not possess. As to their respective duties, they need never clash if the dividing line between them which is recognised in the official Instructions to Medical Officers of Health and Sanitary Inspectors of England and Wales is respected; and if it is borne in mind that the relations of the one officer to the other are indicated in the suggestion that the Medical Officer of Health "shall direct or superintend the work of the Inspector." The dividing line I have indicated, lies in the recognition of a statutory competency on the part of the Medical Officer of Health to form a judgement as to that which is meant by "health" in the human subject, and of the absence of any such statutory competency on the part of the Sanitary Inspector. On either side of this line there is abundant scope for work which will be honourable in its performance and of inestimable value in its results.

REVIEWS OF BOOKS.

THE WHEAT PROBLEM.*

Our readers will be glad to have a reprint of the address given by Sir William Crookes at Bristol in 1898. In the present volume, together with the original address, are sundry criticisms, and the answers thereto. The wheat problem is clearly a problem which equally concerns the statesman and the sanitarian, for if our populations should be underfed, the public welfare and content, as well as the public health, would certainly decline. The paragraph in the report which mostly concerns the sanitarian is given on page 38, where the author says:—

"There is still another and a valuable source of fixed nitrogen, I mean the treasure locked up in the sewage and drainage of our towns. Individually the amount lost is trifling, but multiply the loss by the number of inhabitants and we have the startling fact that in the United Kingdom we hurry down our drains and water courses, into the sea, fixed nitrogen to the value of £16,000,000 per annum. This unspeakable waste continues, and no effective and universal method is yet contrived of converting sewage into corn. Of this barbaric waste of manurial constituents, Liebig, nearly half a century ago, wrote in these prophetic words: 'Nothing will more certainly consummate the ruin of England than a scarcity of fertilisers'—it means a scarcity of food. It is impossible that such a sinful violation of the divine law of nature should for ever remain unfinished; and the time will probably come for England, sooner than for any other country, when with all her wealth in gold, iron, and coal, she will be unable to buy one-thousandth part of the food which she has, during hundreds of years, thrown recklessly away."

Since Liebig wrote this many other countries have begun to follow, in the sewage question, the example of England, so that Liebig's remarks apply to no inconsiderable portion of the civilised world, which means, of course, an increase in the rapidity with which the wheat scarcity may be expected to set in.

We must leave Sir William Crookes to settle with his critics as to whether or not he has under-estimated the power of the wheat-producing area of the world to provide food. It matters little, and does not affect the principle involved, even should it be shown that Sir William is unduly pessimistic in his forecast. It is natural perhaps that so distinguished a chemist should look to chemistry as the "Good Fairy" who is to provide fixed nitrogen for our depleted soils, but nevertheless we are of opinion that this question of fertility must not be looked upon too exclusively from the chemical point of view. The experiments of Lawes and Gilbert seem to cast no small amount of doubt as to whether it is possible to *maintain* the fertility of the soil without organic manures in plenty. Those who study

* By Sir William Crookes, F.R.S., &c. 207 pp. *John Murray, Albemarle Street.* London, 1899.

the invaluable experiments of these two single-minded searchers after truth, will have good cause to think that as the experiments have progressed, the value of farm-yard manure for causing high fertility and for maintaining it has been amply vindicated. Nobody has made any experiments on the different values of different organic manures for special crops. The writer has grown wheat experimentally with human manure for many years, and with the result that the increase has been 835 fold. Surely experiments of this kind are worth trying on a big scale. There are biological conditions underlying fertility, and it is altogether reasonable to suppose that the best manure for wheat is the dung of a wheat-eating animal. It is noteworthy that Denmark produces 43 per cent. more wheat per acre than the United Kingdom, and in Denmark they have not hitherto thrown their fertilizers into the sea. They are making a beginning, however, in Copenhagen. G. V. P.

ARCHITECTURAL HYGIENE; OR, SANITARY SCIENCE AS APPLIED TO BUILDINGS.*

This book is an elementary one, and will prove useful to students and other beginners in the search for light on sanitary matters. It is doubtful, however, whether engineers, surveyors, and medical officers of health will appreciate the intimation that it is written for them.

The scope of the book is wide, covering, as it does, practically the whole of the ground in connection with Architectural Hygiene. This is rather a big undertaking, and, as might be surmised, the various branches of the subject are not equally treated of. The chapters on planning, as also those on ventilation and heating, are full, while others treat of the matters to which they are devoted in rather a superficial way; in fact they present rather a forcible comment on the argument that an architect should be an all-round expert. It is difficult to avoid the conclusion that there is less acquaintance on the part of the Authors with practice than theory; indeed, in connection with some details the perfunctory reference of the professor cannot but be recognized.

The book generally is easily read, and is profusely illustrated with drawings and sketches in the text, but here and there portions are met with which are involved. Take, for instance, the opening of Chapter VII., also the middle paragraph of page 170, dealing with steam heating. With reference to details also there is not that clearness and care in description which could have been wished for. In the eighth line on page 63, in the description of the anti-siphonage arrangements of a trap, the upper side of the trap is mentioned when the lower side is meant. In the penultimate paragraph of page 66, after the description of the anti-siphonage properties of an "anti-D"

* By Banister F. Fletcher, A.R.I.B.A., and H. Phillips Fletcher, A.R.I.B.A. 268 pp. *D. Fourdrinier, "Builder" Office*, 46, *Catherine St., W.C.* London, 1899. Price 5s.

trap, it is stated than an "anti-D" trap can be cleaned out by one flush as against two in the case of the ordinary trap. Doubtless it is meant that among other advantages the water in an "anti-D" may be changed by one flush—but, if so, why sandwich the fact in under the heading of trap ventilation? In the last paragraph on page 72 the explanation of the connection between an earthenware closet trap and a lead soil-pipe ends in the description, with a sketch, of the connection between a soil-pipe and a drain. These are some of the rather many little points which could be mentioned in this connection.

The statement on page 196 as to the primary colours will for a moment startle the reader who may be forgetting that light, and not pigments, is under consideration, but it is doubtful whether even the colours mentioned quite deserve to be recognized by the name ascribed to them.

The inclusion in the book of, sanitary legislation, sample plans and reports, and hints on inspection, renders it a useful one for beginners; indeed, the whole work, despite the exceptions to it taken as above, if only for its comprehensiveness will prove useful to many, and may with advantage find a place on the shelf among the fuller works on the many subjects dealt with. W. C. T.

THE CONSTRUCTION OF ROADS AND STREETS.*

The author has produced a very readable and useful work on a subject which is but imperfectly appreciated, even by some of those whose duty it is to see to the efficiency of road and street construction, and fully meets the object for which he has prepared his notes, as explained in his short Preface.

He gives an historical sketch, which will be read with interest, as it reviews "the history of the evolution of this very important branch of civil engineering practice," which he traces from the year 312 B.C. to the present day, the close of the 19th century A.D.

He follows his history by observations on the selection of line and levels of a new road; then treats of geology as bearing on engineering works, and gives a useful geological table. Several pages follow in which are many practical hints and valuable illustrations, tables, calculations, and specifications.

The construction of "new streets" under the By-Laws of the Local Government Board is dealt with in detail, and a copy of "The Private Street Works Act, 1892," closes this very practical and useful manual.

The illustrations are well done, and are all the more valuable as they contain three excellent portraits of those pioneers of road-making, John Metcalf, John London Macadam, and Thomas Telford, whose example all would do well to follow. L. F.

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* By W. H. Maxwell, Assistant Engineer and Surveyor, Leyton. 260 pp., 8vo. 49 Illustrations. London, The St. Bride's Press, Limited, 13, New Street Hill, Fleet Street, E.C. Price 3s. 6d.

ARTICLES RELATING TO PUBLIC HEALTH,

Appearing in the chief British and Foreign Journals and Transactions.

Abstracts of Titles classified in this List under the following headings:—

Science in Relation to Hygiene and Preventive Medicine.
Hygiene of Special Classes, Trades, and Professions.
Municipal Administration.
Building Materials, Construction, and Machinery.
Water Supply, Sewerage, and Refuse Disposal.
Heating, Lighting, and Ventilating.
Personal and Domestic Hygiene.

Science in relation to Hygiene and Preventive Medicine.

BRUNON, Dr. RAOUL, Directeur de l'Ecole de Médecine de Rouen. Alcoolisme Ouvrier en Normandie. *Revue d'Hygiène*, May, 1899, pp. 426-45.

Lamentable increase of alcoholism among workmen and their families, in Rouen, Havre, Caen, Dieppe, and other towns of Normandy, and its consequences. A truly saddening account. In 45 years (1850-95) the yearly consumption of absolute alcohol in the whole of France has increased from 1·50 to 4·32 litres per head. "France is now high up in the scale of alcoholic countries and this shameful pre-eminence is mainly due to the Normans!"

DROUINEAU, Dr. G. Note sur l'Année démographique, 1897. *Revue d'Hygiène*, January 20, 1899, p. 6.

Statistics of births and deaths in the different Departments of France.

JUILLERAT. Statistique sur deux groupes de maisons de Paris d'après les données fournies par le Casier Sanitaire. *Revue d'Hygiène*, January, 1899, p. 14.

Comparative statistics of two groups of Parisian dwellings, one of which has a relative mortality higher than that of the other, the sanitary circumstances in the two groups being similar, except that in the former case the privy system is more prevalent than in the latter.

CHAVIGNY, Dr. Prophylaxie du Paludisme. *Revue d'Hygiène*, March, 1899, pp. 221-8.

The Mosquito and Malarial Disease.

MARTIN, Dr. A. J. Le Congrès de Berlin contre la Tuberculose. *Revue d'Hygiène*, June, 1899, p. 481-7.

Note on the measures in force in Germany for the prevention of tuberculosis.

MARTIN, Dr. LOUIS. Etude de la prophylaxie pratique de la Diphthérie. *Revue d'Hygiène*, February, 1899, p. 118.

Prophylactic measures adopted by the writer in epidemics of Diphtheria at Privas, Petit-Tournon, and Flaviac. Importance of bacteriological examination of white patches on the tonsils in the early detection of Diphtheria and the prevention of its spread. Success of preventive Antitoxine inoculations.

NETTER, Dr. (Professeur agrégé de la Faculté de Médecine). La souillure de l'atmosphère par les Tuberculeux (poussières sèches et gouttelettes de salive). *Revue d'Hygiène*, April, 1899, pp. 315-21.

A critical review of modern doctrine as to the transmission of pulmonary tuberculosis by dried expectoration and droplets of saliva.

RICOCHON, Dr. Une Epidémie Rurale de Tuberculose. *Revue d'Hygiène*, February, 1899, p. 128.

Spread of Tuberculosis in a rural district from an initial case to a dozen persons in a family (relatives, neighbours, visitors, and relatives at a distance). Discussion of the conditions leading to such marked liability of the disease to spread in certain cases and not in others, *e.g.*, form of nasal fossæ, &c., in relation to detention or otherwise of inhaled bacilli.

LEVI, Dr. RIDOLFE. La Vaccination et la Variole dans l'armée Italienne. *Revue d'Hygiène*, March, 1899, pp. 228-47.

Thirty years statistics as to vaccination and small-pox in the Italian Army.

VAILLARD, Dr. La Fièvre Typhoïde à Cherbourg. *Revue d'Hygiène*, June, 1899, pp. 487-521.

The endemicity of Typhoid Fever in Cherbourg and its causes. Contaminated water supply and insufficient filtration.

VALLIN, Dr. E. Les Mesures de Prophylaxie dans les Laboratoires de Bactériologie. *Revue d'Hygiène*, April, 1899, pp. 281-94.

Résumé of the circular of instructions prepared by a French medical commission, and issued by the Minister of the Interior to the rectors of Universities, with respect to prophylactic means to be taken in bacteriological laboratories. An outcome of the outbreak of Bubonic plague in the Bacteriological Institute at Vienna.

VALLIN, Dr. E. La Prophylaxie dans les Wagons de Chemins de fer. *Revue d'Hygiène*, May, 1899, pp. 385-403.

Report of a commission to enquire into the question of infective railway passengers.

PARMELEE, C. L., and ELLMS, J. W. The Estimation of Suspended Matters in Water. *The Engineering Record*, 5th August, 1899, p. 229.

Rapid methods of estimation :—(i) By comparing with standards; (ii) by measuring amount of light passing through; (iii) by determination of vanishing point of an object.

Hygiene of Special Classes, Trades, and Professions, and Municipal Administration.

BELOUET, M. (Architecte de l'Assistance publique de Paris). Le Sanatorium de Hendaye. *Revue d'Hygiène*, May, 1899, pp. 403-26.

Description, with plans, of the seaside Convalescent Home, at Hendaye, for Parisians.

SERSIRON, Dr. Prix de Revient, d'Entretien et de Fonctionnement d'un Sanatorium pour la Cure hygiénique des Tuberculeux pauvres. *Revue d'Hygiène*, April, 1899, pp. 293-309.

Tuberculosis hospitals for the poor, their structure and cost, staff required and salaries, general outlay (warming, lighting, food, medicines, laboratories, &c.), daily cost, relief fund for the families of patients, &c.

AZIÈRE, M. (Architecte). Crèche Municipale de la Ville d'Héricourt. *Revue d'Hygiène*, April, 1899, pp. 310-15.

Description (architectural) of the Crèche of the town of Hericourt. (Matron's rooms, linen-room, kitchen, playroom, camp-bed-rooms, cradle-bedrooms, lavatories, dairy, cloak-room, nursing-room, isolation chambers, water-closets, disinfector, laundry, warming, ventilation.)

ALDWINCKLE, T. W., F.R.I.B.A. St. Pancras Public Baths and Wash-houses. *The Builder*, 23rd September, 1899, p. 283.

Description of buildings about to be erected in Prince of Wales Road, Kentish Town. Illustrated by plans, sections and elevations.

GOTO, M. le Dr. S. Le Service de Quarantine Militaire pendant la Guerre Sino-Japonaise de 1894-95. *Revue d'Hygiène*, June, 1899, pp. 521-39.

An abridged translation of a report in German to the Minister of the Interior, Japan, of the service entrusted to the direction of Dr. Goto, Chief of the Department of Sanitary Affairs. Measures for the treatment of cholera during the Chino-Japanese war.

LEPAGE, Dr. G. Note sur la Désinfection des Véhicules servant au transport en commun. *Revue d'Hygiène*, January, 1899, p. 59.

Neglect of precautions against infecting public cabs, omnibuses, and the danger therefrom; spitting in omnibuses, &c.; need of orders requiring the windows of cabs on the rank to be kept open. Unnecessary disinfection of cattle trucks after transport of healthy animals, together with total absence of disinfection of railway carriages after occupation by infected persons. Need of special compartments for the infective sick convalescent. Spittoons for railway carriages, cleansing of carriage floors, water-closets. Hygiene unknown by the great railway companies (of France?). Need of reform in view of the forthcoming Exposition.

PÉTRI, Dr. Mesures contre le Danger de la Tuberculose dans les Wagons de Chemin de fer. *Revue d'Hygiène*, January, 1899, p. 19.

Experimental proof of presence of pathogenic bacilli in railway carriages, and their proportion in different compartments; cleansing and disinfection; orders of the Prussian Government as to cleansing and disinfection of railway carriages.

RUSSELL, JOHN A. Street Cleaning in San Francisco. *Engineering Record*, 6th May, 1899, p. 522.

Description of methods, with detailed specifications for contractors.

Building Materials, Construction and Machinery.

FARNHAM, ROBERT, Jun. The Influence of Sewage on Cement. *The Engineering Record*, 19th August, 1899, p. 268.

Tables of tension and compression tests. Showing if loss of strength due to action of sewage on cement.

ROGERS, WALTER A. Tests of Frozen Cement. *The Engineering Record*, 26th August, 1899, p. 294.

Experiments proving that freezing before setting does not injure cement, and that the use of salt counteracts effect of cold in causing slow hardening.

BRINDLEY, WILLIAM, F.G.S. Marble. *The Builder*, Nov. 18th, 1899, p. 461.

Descriptions of the various kinds of marbles, where they are found, how quarried and used, and list of museums containing collections of marbles.

Water Supply, Sewerage and Refuse Disposal.

"BUILDER," EDITOR OF THE. The London Water Question. *The Builder*, November 11, 1899, p. 429.

A criticism of statements in the Report of the Water Committee of the London County Council, chiefly in reference to the need of storage and to the source of supplementary supply from the chalk instead of a supply of "lead-dissolving water" from Wales.

DÉMÉTRIADÉS, GEORGES A. La Distribution d'Eau de la Ville de Salonique (Turquie). *La Technologie Sanitaire*, 15th September, 1899, p. 85.

Description of the artesian wells of Salonica. New formulæ relative to the ascensional force in artesian wells.

VALLIN, Dr. E. L'Epuration des Eaux industrielles à la Station d'expériences de Lawrence. *Revue d'Hygiène*, January, 1899, p. 40.

Description of the purification of trade waters in Massachusetts, from tanneries and wool cleansing works.

RAOULT-DESLONGCHAMPS, Dr., Chirurgien-Major d'Infanterie. De la Stérilisation des Eaux potables par l'Ozone. *Revue d'Hygiène*, April, 1899, pp. 321-24.

Description of the apparatus and process of Messrs. Marmier and Abraham, at Lille, for the purification of the water supply by means of ozone. The results of the process are:—Complete removal of nitrates, total destruction of almost all of the organic matter and all germs, except B. subtilis, of which less than one per c.c. survives; preservation of flavour and freshness without odour. The net cost of an apparatus to treat from 5,000 to 6,000 cubic metres of water per day will not exceed £500.

MARMIER et ABRAHAM, MM. La Stérilisation industrielle des Eaux potables par l'Ozone. *Revue d'Hygiène*, June, 1899, pp. 540-54.

Description (by the makers of the apparatus) of the process for sterilizing water by ozone. Discussion by the members of the Société de Médecine Publique.

FALKENROTH. De l'Influence des variations de pressure dans les Conduites sur les Compteurs d'eau. *La Technologie Sanitaire*, 15th May, 1899, p. 487.

An account of experiments made by the author to calculate the effects of varying pressures upon water meters.

LONDON COUNTY COUNCIL MAIN DRAINAGE COMMITTEE. Report as to the Main Drainage of London, and as to the need of additional outfall sewers. *The Builder*, December 9th, 1899, p. 534.

A statement of facts relating to the increase of population, &c., showing the need of additional sewers, with recommendations and rough estimates for *two* sewers from Abbey Mills to Barking; *one* from Deptford to Crossness; and for a *portion of the suggested new sewer* from Crossness to Catford.

FUERTES, JAMES H., M.Am.Soc.E. Sewage disposal at Glasgow. *Engineering Record*, 20th May, 1899, p. 563.

Detailed description of plant for sewage disposal at Glasgow by treatment with lime and sulphate of alumina, screening through coke and filtering through sand. (Illustrated.)

Heating, Lighting, and Ventilating.

KINEALY, Professor J. H. Heating with steam at or below Atmospheric pressure. *The Engineering Record*, 29th July, 1899, p. 202.

Detail of experiments to determine whether heating buildings with steam at or above the pressure of the atmosphere is the more economical.

MONROE, WILLIAM, S. Modern Practice in Steam heating and Ventilation. *Engineering Record*, Chap. II., 29th April, 1899, p. 499.

Steam heating; one-pipe and two-pipe systems; pressure heaters, open heaters. (Illustrated.)

MONROE, W. S. Modern Practice in Steam heating and Ventilation. *The Engineering Record*, 2nd September, 1899, p. 320.

Radiation—principles of radiators. (Illustrated.) (*Continued.*)

EISERT, HERMAN. The Calculation of Centifrugal Ventilating Fans. *The Engineering Record*, 5th August, 1899, p. 228.

Equations for determining the size of a required fan; speed at which it should be run; horse-power required, &c.

SPATARO, M. D. Ventilation naturelle des Bocaux; Théorie de Recknagel. *Revue d'Hygiène*, February, 1899, p. 97.

The causes of contrary currents occurring in the ventilation of premises and how to avoid them; construction of external walls of buildings. The forces at work changing the air of closed rooms, &c.; temperature; Recknagel's differential manometer; natural ventilation in closed rooms and staircases; spontaneous and artificial ventilation: schools, theatres, churches, laboratories, hospitals. Permeable and impermeable walls.

Personal and Domestic Hygiene.

Rigoux, Dr. A. Etude sur la Valeur Thermique de la Ration Alimentaire du Soldat en Garnison. *Revue d'Hygiène*, March, 1899, pp. 193-221.

The ration of the French soldier considered from the point of view of the thermic value of its respective constituents in time of peace.

Moor, C. G., and Priest, M. Coffee Extracts, their Composition and Analysis. *The Analyst*, November, 1899, p. 281.

Analyses showing deficiency in caffein and the remarkable variations in the composition of coffee extracts.

Measures, Harry B. Rowton House, Hammersmith Road, W. *The Builder*, December 9th, 1899, p. 539.

Description of the fourth of a series of "Poor Men's Hotels," known as "Rowton Houses."

NOTES ON BOOKS AND PAPERS IN TRANSACTIONS.

"Cattle Tuberculosis," by T. M. Legge, M.A., M.D., D.P.H., and [illegible] F.R.C.V.S. [illegible] pp., 8vo. *Baillière*, [illegible] London, 189[illegible].

[illegible] is a practical guide for the farmer, butcher, and [illegible] dealt with in eight chapters, under the [illegible]:—

[illegible] Measures of Prevention; Conditions [illegible] in Great Britain and Abroad; Nature of [illegible] Meat Inspectors; Examination [illegible] Insurance against loss and seizure.

[illegible] Builders' Journal and Architectural Record [illegible] London, September, 1899. [illegible]

[illegible] intended for architects, surveyors, and engineers [illegible] interested in building. The various [illegible]:—

No. 1. [illegible] Prices; No. 2. Notes on Construction [illegible] and Specialities; No. 3. [illegible] Specification Clauses [illegible] Building Act Regulations relating to the [illegible] Engineers and Surveyors.

THE PARKES MUSEUM.

The Museum being entirely for educational purposes, it was found to be little used on holidays; the Council have therefore decided in future to close the Museum on Bank Holidays.

EXAMINATION FOR INSPECTORS OF MEAT AND OTHER FOODS.

The following letter has been received from the Local Government Board:—

26th August, 1899.

SIR,

I am directed by the Local Government Board to acknowledge the receipt of your letter of the 3rd instant enclosing the syllabus of a special Examination which has been arranged by the Sanitary Institute for Inspectors of Meat.

The Board direct me to state that the syllabus of subjects contained in the prospectus which accompanied your letter appears to them to sufficiently cover the various matters upon which the knowledge should be tested of persons desirous of receiving a certificate of competency to fill the post of Inspector of Meat.

I am, Sir,
Your obedient Servant,
JOHN LITHIBY,
Assistant Secretary.

EXAMINATION IN PRACTICAL HYGIENE FOR SCHOOL TEACHERS.

The School Board for London have decided to accept the Certificate of The Sanitary Institute for the purpose of the Board's Certificate of Proficiency in Physical Education, as equivalent to the Advanced Certificate of the Science and Art Department in Hygiene.

ALTERATION IN BY-LAWS.

By-Law 31 has been altered to read as follows:—

The Examiners shall be elected by ballot of the Council. Notice of the Meeting at which the Election will take place, with the names proposed, shall be sent to each member of the Council not less than six days previous. One-fourth of the Examiners shall retire annually, and shall be ineligible for re-election for one year.

MEETINGS HELD OCTOBER TO DECEMBER, 1899.

Sessional Meetings.

A Meeting was held on December 13th, when a Discussion was opened by Arthur Newsholme, M.D., F.R.C.P., D.P.H., on "The Health of Scholars, with special reference to the Education Code and the Board of Education Act, 1899." J. H. Yoxall, M.P., in the chair. The Paper and Discussion will be printed in Part I., Vol. XXI., of the Journal.

Lectures and Demonstrations for Sanitary Officers.

The Twenty-Eighth Course of Lectures and Practical Demonstrations and Visits of Inspection to Trade Premises and Refuse Disposal Works commenced on Friday, Sept. 16th. Sixty-four Students entered their names for this course.

The course was considerably extended in order to cover the subjects in the Practical Sanitary Science and the Meat Inspectors Examinations, and also to meet the requirements of the Sanitary Inspectors Examination Board (*formed by The Sanitary Institute and other bodies*) with regard to the number of lectures.

EXAMINATIONS.

[illegible] Examinations were [illegible]

[illegible] Sanitary Science.

[illegible] Certificates granted.

[illegible] Certificates granted.

[illegible] Nuisances.

[illegible] Newcastle-upon-Tyne. 21 Candidates, [illegible]

[illegible] Certificates granted.

[illegible] Candidates. 51 Certifi- [illegible]

[illegible] and other Foods.

[illegible] Certificates granted.

[illegible] names of the Candidates to whom [illegible]

[illegible] Sanitary Science.

[illegible] Well Walk, Clarence Street.

[illegible] Hebden Bridge.

1899, Nov. 11. ANNIS, CECIL WILLIAM, 3?, Walnut St., Leicester.
1899, Dec. 16. ASHCROFT, HENRY, 82, Heath Street, Golborne, Lancashire.
1899, Nov. 11. ATKINSON, THOS. RICHARDSON, Graham St., Penrith.
1899, Nov. 11. BELL, WILLIAM JAMES, 70, Gainsbro' Grove, Newcastle-upon-Tyne.
1899, Dec. 16. BENNETT, JOHN CHARLES, Walton, near Wakefield.
1899, Dec. 16. BENNETT, WILLIAM HENRY, The Hill, Calthwaite, Carlisle.
1899, Dec. 2. *L* BENTHAM, Miss EVELYN MAY, 14, Nadine Street, Charlton, S.E.
1899, Dec. 2. BEVAN, MANSEL JAMES, 31, Oxford Street, Swansea.
1899, Dec. 2. BLIZARD, EDWARD ERNEST, 5, Cumberland Terrace, Derby Road, North End, Portsmouth.
1899, Dec. 2. *L* BOILEAU, Miss MARGUERITE LE FLEMYNG, 48, Sinclair Road, Addison Road, W.
1899, Nov. 11. *L* BRODIE, Miss KATE G., Auchendinny, Milton Bridge, Midlothian, N.B.
1899, Dec. 16. BROUGHTON, RICHARD, 20, Thornton Place, Sunderland.
1899, Dec 2. BROWN, ARTHUR GEORGE GRAY, 29, Quarry Road, Tunbridge Wells.
1899, Dec. 2. BULL, WILLIAM JOSEPH WALKER, 2, Beet Villas, Northcote Road, Sidcup.
1899, Dec 16. BURNS, THOMAS JAMES, 5, Ismay Road, Litherland, Liverpool.
1899, Dec. 16. BURTON, THOMAS, 6, Park Terrace, Keighley.
1899, Dec. 2. BUTTERELL, ARTHUR, 43, Almond Bank Terrace, W. Merchiston, Edinburgh.
1899, Dec. 16. BUTTERWORTH, JOSEPH, 115, Scotland Road, Nelson, Lancashire.
1899, Dec. 16. CARTER, ARTHUR HERBERT, North View, Heathfield Road, King's Heath, Birmingham.
1899, Dec. 2. CHAPMAN, FREDERICK RAYMOND, Glaston Road, Uppingham.
1899, Nov. 11. CHAPMAN, MATTHEW, 11, Maude Street, Grimsby.
1899, Dec. 2. CLARK, HOWARD GEORGE, 134A, Park Road, Crouch End, N.
1899, Dec. 16. COCKBURN, WILLIAM LAWRENCE, 72, Seel Street, Liverpool.
1899, Dec. 2. COTTEE, ELLIS CUTHBERT, 55, Beatrice Road, Bermondsey.
1899, Dec. 16. COTTERILL, HARRY HOBSON, Wellington House, Worksop.
1899, Dec. 2. COULSON, JOHN HENRY PYE, 77, Oak St., Norwich.
1899, Dec. 2. CRISP, HENRY ROBERT, 6, Church Terrace, Ealing.
1899, Dec. 2. DONNEWALD, VICTOR EDWARD FRANCIS. 49, Adys Road, E. Dulwich.

1899, Dec. 16. Dryland, Henry, 13, Abbey Street, Greenheys, Manchester.
1899, Dec. 2. Edmed, George Henry, West Malling, Maidstone.
1899, Dec. 16. Eginton, Arthur Thomas, 22, Hongoumont Avenue, Waterloo, Liverpool.
1899, Dec. 16. Franklin, John, 43, Rae Street, Stockport.
1899, Dec. 2. Fraser, Archibald Wilson, Public Health Department. Hay Lane, Coventry.
1899, Dec. 16. Garlick, Tom, 163, Ashton Road, East Failsworth.
1899, Dec. 2. Gibbons, James Thomas, 66, Penton Place, Kennington, S.E.
1899, Dec. 16. Giles, Charles Bunn, 21, Scarisbrick Avenue, Litherland, Liverpool.
1899, Dec. 2. Gillings, William George, Balliol House, Wentworth Street, E.
1899, Dec. 2. Goodall, Horatio Charles, Tyne House, St. Catherine's, Lincoln.
1899, Dec. 2. Goodman, James, 24, Government Row, Enfield Lock.
1899, Dec. 16. Gorton, Lewis James Nurse, 51, Humber Road, Wolverhampton.
1899, Dec. 16. Green, Albert, 22, Ashwood Road, Parkgate.
1899, Dec. 16. Griffith, William Owen, 17, Glanhwfa Road, Llangefni.
1899, Dec. 2. Groves, Esau Henry, 150, Fenchurch Street, E.C.
1899, Dec. 2. Hancock, William, 56, Prince Street, Bristol.
1899, Dec. 16. Hartley, Herbert, 8, Hemans Street, Liverpool, S.
1899, Dec. 16. Herringshaw, Alfred, 15, Chester Road, Macclesfield.
1899, Dec. 16. Henry, James Austin, 17, Percival Street, Ardwick Green, Manchester.
1899, Dec. 16. Heslop, John, 39, Upper Moss Lane, Manchester.
1899, Dec. 16. Hewitt, Frank, 94, Lower Bridge Street, Chester.
1899, Dec. 2. Hill, Charles, 4, Church Terrace, South Ealing.
1899, Dec. 2. *L* Holmes, Miss Rose Beatrice Wyman, 4, Croftdown Road, Highgate Road, N.W.
1899, Dec. 2. Hosier, Frederick George, Kingston Villas, Judd Road, Tonbridge.
1899, Nov. 11. Jameson, James, Belle Villa, Ponteland, Newcastle-upon-Tyne.
1899, Dec. 16. Jones, Gilbert Wright, 87, South View, Harwood, near Bolton-le-Moors.
1899, Dec. 2. Jones, George Arthur, 18, Edwin St., Gravesend.
1899, Dec. 2. Jones, Thomas, Sedgley House, Duckpool Road, Newport, Mon.
1899, Dec. 16. Kenyon, Lawrence, 88, Market Street, Tottington, Bury.
1899, Dec. 16. King, Peter, Station Road, Mirfield, Yorks.
1899, Dec. 2. *L* Le Lean, Miss Mary Kate, 23, Mecklenburgh Square, W.C.

Dec. 2. Lockton, Herbert William, 6, Lombard Street, Newark.
Dec. 2. Loughlin, Austin William, 105, Columbia Road, Hackney Road, Bethnal Green, E.
Dec. 2. Lumley, Edward, 141, Queen's Rd., Bayswater, W.
Dec. 16. Mackie, Matthew Arnot, Main Street, Muirkirk, N.B.
Dec. 16. Makin, John, 97, Holme Lane, Hillsbro', Sheffield.
Nov. 11. Martin, Warwick Hammond, 3, Co-operative Buildings, Seaton Delaval, Northumberland.
Dec. 2. Mathews, Richard James, 68, Plassy Street, Penarth, Cardiff.
Dec. 16. Miner, Ernest Fossie Bertie Albert, 8, Bloxwich Road, Walsall.
Dec. 16. Mousir, Alfred Lawrence, 365, Edge Lane, Liverpool.
Dec. 16. *L* Mulcahy, Miss Ellen Ellie, 31, Catherine Street, Liverpool.
Dec. 2. Nicholson, Bernard Lee, St. Miles Bridge, Norwich.
Dec. 16. Nicholls, James Charles, 28, Devonshire Street, Accrington.
Dec. 2. *L* Orme, Miss Brenda Temple, 213, Uxbridge Road, Shepherd's Bush, W.
Dec. 16. Parkin, Chas. Ed., Jr., Godstone Road, Rotherham.
Dec. 16. Peacock, Stanley Chesters, 46, Yarburgh Street, Moss Side, Manchester.
Dec. 16. Pearson, Edward Mazzini, 12, Claremont Road, Irlams-o'-the-Height, Lancashire.
Dec. 2. Pike, William Ernest, 103, Shirland Road, Paddington, W.
Dec. 2. Plowman, Vernon Attrill, 41, Lorne Road, Stroud Green, N.
Dec. 16. Plumbley, Jeremiah, 7, George Street, Nelson.
Dec. 16. Pollard, John, 97, Stanhope Street, Liverpool.
Dec. 16. Power, Edward Gibson, Portrack Lane, Stockton-on-Tees.
Nov. 11. Ramsbottom, Thomas, Dinsdale Park, Darlington.
Dec. 2. Ramsden, Frederick St. Bede, 25, Athenæum Street, Plymouth.
Dec. 16. Richards, Henry Willoughby, 20, Hamstead Road, Handsworth.
Dec. 16. Richards, John, 4 House, 1 Court, Cromwell St., Oldham.
Dec. 2. Richardson, Arthur George, 2, Leamington Avenue, Hoe Street, Walthamstow.
Dec. 2. *L* Richardson, Miss Mona Willingham, 9, Cranbourne Court, Albert Bridge Road, S.W.
Dec. 16. Ross, Archibald James, 14, Water Street, Skipton.

1899, Dec. 2. RUGGLES, SAMUEL, North Road, Brentwood.
1899, Dec. 16. SAYLE, HENRY PETER, 11, Sydney Terrace, Greenbank, Northwich, Cheshire.
1899, Dec. 2. SENDELL, FRANK GUY, 56, Aldworth Road, West Ham.
1899, Dec. 2. SLAUGHTER, LEONARD, Headley, Hamilton Road, Southville, Bristol.
1899, Dec. 2. SLAUGHTER, RICHARD, 110, Beavley Road, Bedminster, Bristol.
1899, Dec. 16. SMEDLEY, JOHN HENRY MOORE, 141, Bedford Road, Rock Ferry, Cheshire.
1899, Dec. 16. STOREY, ERNEST, 75, Sunnyside Street, Salford.
1899, Dec. 16. *L* STUART, Miss MARIE, 81, St. Helen's Gardens, North Kensington, W.
1899, Dec. 2. STUART, ROBERT GRANT, 30, Despard Road, Highgate Hill, N.
1899, Nov. 11. STURDY, THOMAS WATSON, 1, Third Street, Wallsend-on-Tyne.
1899, Nov. 11. SYMON, JAMES, Century House, Church Street, Blaydon-on-Tyne.
1899, Nov. 11. THOMLINSON, JOHN, 96, Brinkburn Avenue, Gateshead.
1899, Dec. 2. TWEED, CHARLES CASBURN, 61, Caistor Park Road, West Ham.
1899, Dec. 2. VINCENT, CHARLES JOHN, 33, King St., Southsea.
1899, Nov. 11. WALLIN, WILLIAM, 17, Alexandra Terrace, Newcastle-upon-Tyne.
1899, Dec. 2. WARREN, ANDREW, Weston, Totnes, South Devon.
1899, Dec. 16. WESTBROOK, ERNEST REECE, 82, Junction Street, Queen's Road, Newton Heath, Manchester.
1899, Dec. 2. WHITE, ARTHUR DAVID, 79, Albany Street, N.W.
1899, Dec. 16. WHITE, ELLIS FOULKES, Treanedd, Segontium Road, South, Carnarvon.
1899, Dec. 2. WILKIE, ROBERT EDWIN, 55, The Grove, Hammersmith, W.
1899, Dec. 16. WILLAN, ROBERT WILLIAM, 518, Liverpool Street, West Seedley.
1899, Nov. 11. WITTEN, CHARLTON POTTS, 13, Elwin Terrace, Sunderland.
1899, Dec. 16. WOOD, EDWARD, 1, Tindall Street, Pendleton.
1899, Dec. 16. WOOD, JAMES WM., 44, Carleton Street, Nelson.
1899, Dec. 16. YOUD, THOMAS, Huxley, near Chester.

Inspectors of Meat and Other Foods.

1899, Dec. 9. ADAMS, RICHARD, Vestry Hall, City Road, E.C.
1899, Dec. 9. ANDERSON, WM., 113, Milton Avenue, East Ham.
1899, Dec. 9. CUCKNEY, JAMES ALFRED, The Abattoir, Brighton.

1899, Dec. 9. HUGALL, TOM NEWTON, 29, Tanza Road, Hampstead, N.W.
1899, Dec. 9. MILLER, JOHN EDWARD, Holmwood, Patrington, Hull, Yorks.
1899, Dec. 9. NETTLETON, CHAS. WM., 8, Strickland Street, St. John's, Deptford, S.E.
1899, Dec. 9. SPADACCINI, HENRY, 8, Perry's Close, Poplar, E.
1899, Dec. 9. TOPPING, HERBERT, 94, Nelson St., Fishpool, Bury.
1899, Dec. 9. WILKINSON, HARGREAVES, 18, Hamilton St., Bury.

Examination Questions.

Inspector of Nuisances.—Newcastle-upon-Tyne, November 10th and 11th, 1899.

1. What are the powers of District and County Councils with respect to the provision of Infectious Diseases Hospitals? What cubic space per patient is generally insisted upon in such Hospitals?
2. Describe in detail how you would proceed to take sample under the Food and Drugs Adulteration Acts of *(a)* Butter; *(b)* Seidlitz Powders. In the event of the analyst certifying the samples to be adulterated, what further action would you take?
3. What powers have Sanitary Authorities *to compel* the removal to Hospital of persons suffering from dangerous Infectious Diseases? And state what action can legally be taken to enforce prompt disinfection of a dwelling where a person has just died of small-pox.
4. Mention the chief Nuisances enumerated under the Public Health Act, 1875. State clearly the power of a Sanitary Authority to deal with these.
5. In examining a carcase of meat, what might you infer if the lean flesh was unnaturally *(a)* dark; *(b)* pale; or *(c)* watery? Or if the fat was *(a)* yellow; *(b)* green; or *(c)* grey?
6. State the physical characteristics of water obtainable from underground and surface supplies, respectively, and also which of these characteristics are good and which are objectionable.
7. Sketch various forms of joint in lead piping, both in continuous line and for branches, showing how the pipes should be dressed and how soldered. Describe common defects in this class of work.
8. To what points would you look for an indication of the condition of house drains without applying tests.

The Candidates were examined vivâ voce *on the 11th.*

Practical Sanitary Science.—London, December 1st and 2nd, 1899.

1. What is the physical cause of rain? Explain the construction of a good rain gauge and the conditions that have to be observed to obtain reliable measurements of rainfall.

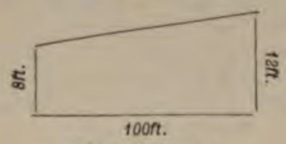
2. Describe the good and bad effects from a hygienic point of view arising from building on the following soils:—

Limestone Rock.	Clay.
Chalk.	Cultivated Soils.
Gravels.	Made Soils.
Sands.	

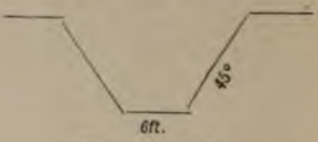
3. What difficulties are caused by the non-elasticity of water in pipes, &c., and how are they overcome? Explain the formation of an air-lock in pipes and its effects.

4. In estimating the volume of water necessary for a town supply, what conditions have you to consider? and how many gallons per head should be allowed for domestic purposes?

5. In making a cutting 100 feet long, with a level bottom 6 feet wide, one end 8 feet deep and the other end 12 feet deep, the sides having an inclination of 45°; how many cubic yards would be excavated and how many gallons of water would it hold?



LONG SECTION.



CROSS SECTION.

6. What precautions should be taken in the construction of the basements and roofs of houses to prevent damp in the house?

7. Explain the merits and defects as means of warming and ventilation of

(a) Open fires. (c) Hot water.
(b) Hot air. (d) Steam.

State the conditions most suitable for the adoption at each of these. Describe and sketch the best form of open fire-place you know.

8. How would you carry out a thorough testing of new house drains, soil pipes, and connections therewith?

The Candidates were examined vivâ voce *on the 2nd.*

Inspector of Nuisances.—London, December 1st and 2nd, 1899.

1. Define the powers of entry of an Inspector into
   (a) Schools.
   (b) A Factory.
   (c) A Dwelling House where Scarlet Fever has occurred.
   (d) Premises where a Cesspit is overflowing.

   State under what Act, Regulation, or Order the powers are given.

2. What are the powers of Sanitary Authorities for dealing with any person who gives, lends, sells, transmits, or exposes, without

previous disinfection, any bedding, clothing, rags or other things which have been exposed to infection?

3. What conditions render butchers' meat and cows' milk unfit for food, and how are these conditions to be recognised?

4. What are the main provisions of the Sale of Food and Drugs Amendment Act, 1879? What points would you note and what precautions would you adopt in taking samples of milk suspected of adulteration, at a railway station, during the transit of the milk from the farmer to the consignee.

5. In ventilation, what relation does cubic space bear to air removal? How often would it be necessary to change the air in a room of 2,016 cubic feet, which is occupied by four men at work?

6. Give particulars of the different ways in which water in water mains and service pipes outside dwellings may become polluted.

7. In laying a drain it is found that "made ground" consisting of loose material occupies the site. Describe what measures of precaution should be taken to secure a permanently sound drain, and describe how the jointing should be carried out.

8. Describe and give sketches of various ways of connecting the traps of W.C. apparatus with iron and lead soil pipes.

The Candidates were examined vivâ voce *on the 2nd.*

Inspectors of Meat and Other Foods.—London, December 8th and 9th, 1899.

1. What procedure should be adopted with regard to the seizure of Meat, Fruit, and Tinned Provisions, unfit for human food?

2. What are the chief provisions of the Model Bye-laws issued by the Local Government Board with regard to Slaughterhouses and Markets?

3. What conditions apparent in a living Cow would you consider indicative of the existence of tuberculosis?

4. What would be the local signs after death of :—

(*a*) Dropsy.
(*b*) Extensive bruises.
(*c*) Some inflammatory disease.

5. If you found a carcase affected by disease, how would you determine whether the disease was local or general, and what action would you suggest should be taken with the carcase in each case?

6. Name the abdominal organs of a Cow, and state the features with distinguish them from similar organs of a Horse.

7. Describe the appearance of a healthy lymphatic gland. Locate those glands which an Inspector would examine in a carcase apparently diseased.

8. What are the appearances and characteristics of fresh Ox Flesh, Fat, Fish, Poultry, and Green Vegetables?

9. Sketch out the requirements which you regard as essential to the storing of milk supplies, and animal foods generally, previous to distribution.

10. Animals are slaughtered by:—
   (*a*) Poleaxing and bleeding.
   (*b*) Stunning and bleeding.
   (*c*) Bleeding alone, as in the Jewish method, and as usually practised on Swine.

What are the advantages and disadvantages of each method?

The Candidates were examined vivâ voce *on the 9th.*

Practical Sanitary Science.—Manchester, Dec. 15th and 16th, 1899.

1. State how the following elements affect the flow of water in pipes, viz.: head—diameter—hydraulic mean depth—horizontal and vertical bends—lengths.

2. What are unhealthy conditions for building purposes on hill and plain, and in a valley?

3. How would you define "hard" and "soft" water; what is the effect of each on water mains, house pipes, and fittings?

4. Give a sketch of a filter bed (plan, sections, and details), capable of filtering water derived from a river, for the supply of a town of 15,000 inhabitants, and also sketch a service reservoir for three days' supply, constructed in concrete, and state what are the conditions requisite for efficient filtration and storage.

5. What are the characteristics of cast iron, wrought iron, and steel, and to what particular forms of construction are they especially adapted?

6. Describe a method of effectively changing the air inside
   (*a*) Hospital Ward containing 20 beds.
   (*b*) School Class Room for 40 children.

Explain how the presence of persons in a closed room diminishes the purity of the air. State how often the air of a living room should be changed per hour. Give an example, with the size of a room and the number of occupants. Describe the "plenum" method of ventilation.

7. What are the local conditions which govern the disposal of sewage
   (*a*) By discharging into the sea or tidal river.
   (*b*) By application to land.
   (*c*) By the action of bacteria?

8. What are the provisions in regard to structure under the Dairies, Cowsheds, and Milkshops Orders.

The Candidates were examined vivâ voce *on the 16th.*

Inspector of Nuisances.—Manchester, December 15th and 16th, 1899.

1. Explain in detail the procedure in the inspection of a canal boat, mention the points to be reported upon in the "Examining Officer's report'.'

2. Define the terms "Food" and "Drug" as interpreted by the Sale of Food and Drugs Act, 1875. What steps would you, as an Inspector under the above mentioned Act, take with regard to a person refusing to sell to you an article of food exposed for sale?

3. Give a list of the diseases ordinarily scheduled under the Infectious Diseases (Notification) Act, 1889, and state the precautionary measures that are considered necessary for limiting the spread of each.

4. In investigating an attack of Typhoid Fever in a rural village dependent on wells for its water supply, and where cesspools are common, what particular circumstances would you enquire into, and what precautions would you impress upon the inhabitants?

5. Mention some of the devices adopted by unscrupulous Butchers to conceal disease in meat, and state how you would deal with them.

6. Describe a proper arrangement of the water supply fittings of a dwelling (containing say ten rooms). Give sketch of same.

7. State the kinds of organic pollution which waters are subject to at their various sources, and what precautions are necessary to prevent the same.

8. Make sketches of, and explain, the best way of jointing stoneware drains. How would you test both newly-made and also old drains?

The Candidates were examined vivâ voce *on the 16th.*

FORTHCOMING MEETINGS.

Calendar, January to March, 1900.

As far as at present arranged.

Council Meetings are held Monthly on the Second Wednesday in each Month at 5 p.m., except August and September.*

Special Purposes Committee	Third Monday at 5 p.m.
Finance Committee	Second Wednesday at 4.30 p.m.
Exhibition Committee	First Monday at 5 p.m.
Congress and Editing Committee	Second Monday at 5 p.m.
Museum and Library Committee	Fourth Monday at 5 p.m. (except December).
Examination Committee	Fourth Thursday in Jan. 5 p.m.
Parliamentary Committee	As occasion requires.
Rivers Pollution Committee	
Meat Inspectors Exam. Committee	

* *The Council Meeting in April will be on the first Wednesday.*

JANUARY.

Lectures to Sanitary Officers at 8 p.m. — John Castell-Evans, F.I.C.

19 F. Mechanical Physics; Laws of Motion, &c.
24 W. Natural Forces; Light, Heat, Electricity.
26 F. The Atmosphere Pressure and Composition.

29 M. Lecture to Sanitary Officers at 8 p.m. Elementary Statistics, by Edward F. Willoughby, M.D.LOND., D.P.H.LOND. & CAMB.

31 W. Lecture to Sanitary Officers at 8 p.m. Water; Composition, Pollution and Purification. John Castell-Evans, F.I.C.

26 F. 27 S. Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Belfast.

FEBRUARY.

2 F. Lecture to Sanitary Officers at 8 p.m. Air and Ventilation; Combustion and Respiration, by John Castell-Evans, F.I.C.
5 M. Lecture to Sanitary Officers at 8 p.m. Meteorology, by Prof. J. Lane Notter, M.A., M.D., D.P.H.
7 W. Lecture to Sanitary Officers at 8 p.m. Soil and Local Physical Conditions, by John Castell-Evans, F.I.C.
8 Th.
9 F. } Examination in Practical Hygiene for School Teachers, London.
10 S.
9 F. Lecture to Sanitary Officers at 8 p.m. Sanitary Law—English, Scotch, and Irish; General Enactments, Public Health Act, 1875; Model By-Laws, &c., by Herbert Manley, M.A.CANTAB., M.B., D.P.H., Medical Officer of Health, West Bromwich.
10 S. Inspection and Demonstration.
12 M. Lecture to Sanitary Officers at 8 p.m. Public Health Statutes; Orders, Memoranda, and Model By-Laws of the Local Government Board, and By-Laws in Force in the Administrative County of London, by L. C. Parkes, M.D., D.P.H., M.O.H., Chelsea.
14 W. **Sessional Meeting at 8 p.m.** Discussion on Sanitary Condition of London Streets, to be opened by W. Nisbet Blair, M.INST.C.E.
14 W. Inspection and Demonstration.
14 W. Lecture to Sanitary Officers at 8 p.m. Objects and Methods of Inspection, Nuisances, &c.
16 F. Lecture to Sanitary Officers at 8 p.m. Trade Nuisances, by Prof. A. Bostock Hill, M.D., D.P.H.CAMB., F.I.C., Queen's Professor of Hygiene and Public Health, Mason's University College, Birmingham, Med. Officer of Health, Sutton Coldfield.
17 S. Inspection and Demonstration.
19 M. Lecture to Sanitary Officers at 8 p.m. Infectious Diseases, by P. Boobbyer, M.B., M.R.C.S., Medical Officer of Health, Nottingham.
21 W. Inspection and Demonstration.
21 W. Lecture to Sanitary Officers at 8 p.m. Methods of Disinfection, by Henry R. Kenwood, M.B., D.P.H., F.C.S., Assist. Professor of Hygiene, University College, Medical Officer of Health, Stoke Newington.
23 F. Lecture to Sanitary Officers at 8 p.m. Calculations and Measurements, and Plans and Sections.
24 S. Inspection and Demonstration.
26 M. Lecture to Sanitary Officers at 8 p.m. Ventilation, Warming, and Lighting, by Joseph Priestley, B.A., M.D., M.R.C.S., D.P.H.CAMB., Med. Officer of Health, Lambeth.
28 W. Inspection and Demonstration.
28 W. Lecture to Sanitary Officers at 8 p.m. Water Supply, Drinking Water, Pollution of Water, by J. C. Thresh, D.SC., M.D., D.P.H., F.I.C., M.O.H. Essex C.C.

MARCH.

2 F. Lecture to Sanitary Officers at 8 p.m. Building Materials, by H. D. Searles Wood, F.R.I.B.A.
2 F. } Examinations in Practical Sanitary Science and for Inspectors of
3 S. } Nuisances, Exeter.
5 M. Lecture to Sanitary Officers at 8 p.m. Sanitary Building Construction and Planning, by Percival Gordon Smith, F.R.I.B.A.
7 W. Inspection and Demonstration.
7 W. Lecture to Sanitary Officers at 8 p.m. Sanitary Appliances, by Geo. Reid, M.D., D.P.H., Med. Officer of Health, Stafford County Council.
9 F. Lecture to Sanitary Officers at 8 p.m. Details of Plumbers' Work, by J. Wright Clarke.
10 S. Inspection and Demonstration.
12 M. Lecture to Sanitary Officers at 8 p.m. House Drainage.

14 W. **Sessional Meeting at 8 p.m.** Developments in Bacterial Treatment of Sewage, by Prof. F. Clowes, F.I.C.
14 W. Inspection and Demonstration.
14 W. Lecture to Sanitary Officers at 8 p.m. Sewerage and Sewage Disposal, by Prof. Henry Robinson, M.INST.C.E.
16 F. Lecture to Sanitary Officers at 8 p.m. Scavenging, Disposal of House Refuse, by Charles Jones, M.INST.C.E., Engineer and Surveyor, Ealing Urban District Council.
17 S. Inspection and Demonstration,
19 M. Lecture to Sanitary Officers at 8 p.m. The Practical Duties of a Sanitary Inspector, by Reginald Dudfield, M.A., M.B., D.P.H., Medical Officer of Health, Paddington.
21 W. **Ordinary General Meeting at 5 p.m.**
21 W. Lecture to Sanitary Officers at 8 p.m. Factory and Workshop legislation as it affects the Sanitary Inspector.
23 F. Lecture to Sanitary Officers at 8 p.m. Signs of Health and Disease in Animals destined for Food, when alive and after slaughter; Tuberculin and other Tests, by W. Hunting, F.R.C.V.S.
23 F., 24 S. Examinations in Practical Sanitary Science and for Inspectors of Nuisances, Birmingham.
24 S. Inspection and Demonstration.
26 M. Lecture to Sanitary Officers at 8 p.m. The Names and Situations of the Organs of the Body in Animals, by W. F. Shaw, F.R.C.V.S.
26 M. Inspection and Demonstration.
28 W. Lecture to Sanitary Officers at 8 p.m. The Appearance and Character of Fresh Meat, Organs, Fat, Blood, Fish, Poultry, Milk, Fruit, Vegetables, and other food, and the conditions rendering them, or preparations of them, fit or unfit for human consumption, by Alfred Hill, M.D., F.R.S.E., F.I.C., Medical Officer of Health, Birmingham.
30 F. Lecture to Sanitary Officers at 8 p.m. Diseased meat with a demonstration of Morbid Specimens collected from Meat Markets.
30 F., 31 S. Examinations for Inspectors of Meat and other Foods, Birmingham.

APRIL.

2 M. Lecture to Sanitary Officers at 8 p.m. The Hygiene of Byres, Lairs, Cowsheds, and Slaughter-houses, and all places where animals destined for the supply of food are kept, and the Hygiene of Markets, Dairies, and other places where food is stored, prepared, or exposed for sale, and transported.
4 W. **Sessional Meeting at 8 p.m.** Housing of the Working Classes in London in the future, by T. Blashill, F.R.I.B.A.
4 W. Lecture to Sanitary Officers at 8 p.m. Practical Methods of Stalling and Slaughtering Animals, Preserving and Storing Meat and other Foods, by R. S. Marsden, D.SC., M.B., F.R.S.E.
6 F. Lecture to Sanitary Officers at 8 p.m. The Laws, By-Laws, and Regulations affecting the Inspection and Sale of Meat and other articles of food, including their preparation and adulteration.
13 F. GOOD FRIDAY.
27 F., 28 S. Examination in Practical Sanitary Science and for Inspectors of Nuisances, London.

Institute Dinner, early in May.

Congress at Nottingham, at the end of August.

A complete List of the Lectures will be ready in January, and will be supplied to any Member or Associate on application.

FELLOW, MEMBERS, & ASSOCIATES ELECTED.

FROM SEPTEMBER TO DECEMBER, 1899.

(A complete list can be had on application.)

FELLOW.

Reg. No. | Date of Election.

1899. Oct. HARRIS, A. Wellesley. M.R.C.S., L.S.A., D.P.H., M.O.H., *Municipal Offices, Southampton.*

MEMBERS.

* Passed the Examination of the Institute in Practical Sanitary Science.
† Passed Examination for Local Surveyors.
‡ Passed Examination for Inspectors of Nuisances.

1327 1899. Oct. *‡AINLEY, Edwin, *Lower Park, Berry Brow, Huddersfield.*

1340 1899. Nov. ARCHER, Oakley, ASSOC.M.INST.C.E., *City Engineer, Christchurch, N.Z.*

1341 1899. Nov. BANKS, Alfred, F.R.C.S.ENG., L.R.C.P.LOND., D.P.H., *West Hill Tower, Ryde, I.W.*

1369 1899. Dec. BIRMINGHAM, Charles L., M.D., M.B., M.O.H., *The Mall, Westport, Mayo, Ireland.*

1328 1899. Oct. BUTTERWORTH, Arthur S., ASSOC.M.INST.C.E., *Borough Surveyor, Hythe.*

1370 1899. Dec. CHANNER, Lieut.-Col. Osborne Henry, M.B., C.M., D.P.H., I.M.S., *c/o Messrs. Watson & Co., Agents and Bankers, Bombay.*

1342 1899. Nov. *‡CHEETHAM, Augustus Ernest, 70, *Church Road, Urmston, Manchester.*

1343 1899. Nov. CORBETT, Patrick Joseph, ASSOC.M.INST.C.E., *Executive Engineer, River Indus District, Karachi, Sind, India.*

1330 1899. Oct. CORNEY, B. Glanvill, M.R.C.S., *Suva, Fiji.*

1329 1899. Oct. CUTHBERT, Edwin, M.INST.C.E., *Engineer and Secretary, Drainage Board, Christchurch, New Zealand.*

1331 1899. Oct. DE CLIVE-LOWE, George Thomas Humphrey, *Symond Street, Auckland, New Zealand.*

1344 1899. Nov. DIBDIN, William Joseph, F.I.C., F.C.S., *Sutton, Surrey.*

1345 1899. Nov. EYRE, John William Henry, M.D., M.S.DUNEDIN, D.P.H.CAMB., *Charing Cross Hospital, W.C.*

1346 1899. Nov. ‡GREEN, John Singleton, *Borough Engineer and Surveyor, Haslingden, Lancs.*

1347 1899. Nov. GUILBERT, Thomas James, *Colborne Villa, Rohais, Guernsey.*

Reg. No.	Date of Election.	
1348	1899. Nov.	Harding, James Joseph, D.P.H., M.O.H., *Ballincollig, Co. Cork.*
1349	1899. Nov.	Hayward, Charles James, 81, *New Bond Street, W.*
1350	1899. Nov.	Hunt, Gilbert James, *Borough Engineer and Surveyor, Dorchester.*
1351	1899. Nov.	Hunting, William, F.R.C.V.S., 16, *Trafalgar Square, Chelsea, S.W.*
1352	1899. Nov.	†Killick, William Henry, *Municipal Offices, Southampton.*
1353	1899. Nov.	Lea, Measham, *Dep. Borough Engineer and Surveyor, Crewe.*
1371	1899. Dec.	Longley, Henry Banks, *City Engineer's Office, St. Mary's Hall, Coventry, Warwick.*
1372	1899. Dec.	Martin, R., 76, *Brunswick Avenue, Beverley Road, Hull.*
1333	1899. Oct.	Miller, George Frederick, *Assistant Borough Surveyor, Town Hall, Hastings.*
1354	1899. Nov.	Nichols, Albert Edward, ASSOC.M.INST.C.E., *Borough Surveyor, Folkestone.*
1355	1899. Nov.	*Owen, John Richard, 21, *Herbert Street, Moss Side, Manchester.*
1356	1899. Nov.	Plummer, Arthur Benjamin, F.R.I.B.A., 13, *Grey Street, Newcastle-upon-Tyne.*
1334	1899. Oct.	Pottinger, John Curwen, M.INST.C.E., *Poona.* (*Superintending Engineer, Bombay P. W. D., and Sanitary Engineer to the Government of Bombay.*)
1357	1899. Nov.	Preece, Sir William Henry, K.C.B., F.R.S., M.INST.C.E., *Gothic Lodge, Wimbledon.*
1358	1899. Nov.	*Pugh-Jones, David, *Grongar House, Llandaff.*
1335	1899. Oct.	Roberts, Frank, ASSOC.M.INST.C.E., *Borough Surveyor and Engineer, Town Hall, Worthing.*
1359	1899. Nov.	Robinson, Matthew Alec, M.R.I.B.A.IRELAND, *Richmond Street, Londonderry.*
1360	1899. Nov.	Shanks, William, *Barrhead, N.B.*
1361	1899. Nov.	Shanks, John, *Barrhead, N.B.*
1337	1899. Oct.	Shaw, Harold, B.A., M.B.CAMB., D.P.H., *Whitecroft, Carisbrooke, I. W.*
1362	1899. Nov.	Shelly, Charles Edward, M.A., M.D., M.R.C.P.LOND., *Hertford.*
1363	1899. Nov.	Simpson, Percy John, M.R.C.V.S., *Strathmore House, Maidenhead.*
1364	1899. Nov.	Stilgoe, Henry Edward, ASSOC.M.INST.C.E., *Borough Engineer, Town Hall, Dover.*
1365	1899. Nov.	Symons, M., *Rotterdam.*
1336	1899. Oct.	*Tamlyn, William John, *The Parade, Minehead, Somerset.*
1338	1899. Oct.	*Taylor, George Sylvester, 3, *Augusta Road, Moseley.*
1366	1899. Nov.	Thudichum, Geo. Dupré, F.C.S., 2, *Edinburgh Mansions, Howick Place, Westminster.*

Reg. No. Date of Election.

1339 1899. Oct. WHITE, William Herbert, ASSOC.M.INST.C.E., *Manor Farm, Witley, Surrey.*

1367 1899. Nov. WREFORD, John, M.B., B.HY.DURH., M.R.C.S., L.R.C.P., 59, *Osborne Road, Newcastle-on-Tyne.*

1368 1899. Nov. YOUATT, Leonard, M.B., CH.B., D.P.H.VIC., 43, *Market Place, Great Yarmouth.*

ASSOCIATES.

M. Passed Examination for Meat Inspectors.

‡ Passed Examination for Sanitary Inspector.

1999 1899. Oct. ‡ALDERSON, Charles Henry, 23, *Ossington Street, Bayswater, W.*

2042 1899. Dec. ‡ALLOTT, Fredk. James, 5, *School Street, Wombwell, near Barnsley. Yorks.*

2016 1899. Nov. ‡BARTON, Miss Eleanor Constance, *Chelsea Infirmary, S. Kensington, S.W.*

2017 1899. Nov. ‡BOOL, Thos. Edward, 34, *Rawmarsh Hill, Parkgate, Rotherham.*

2018 1899. Nov. ‡BROCKS, Walter Wm., *Stoke Bishop, near Bristol.*

2000 1899. Oct. ‡CAWOOD, Charles, *Whixley York.*

2025 1899. Nov. ‡COCKCROFT, Wm. Hy., 42, *Caledon Road, E. Ham.*

2019 1899. Nov. ‡CORNISH, George, 12, *Wellington Street, Stoke, Devonport.*

2001 1899. Oct. ‡CRIGHTON, Alexander Muir, M.R.C.V.S., *Sandon, Lisburn, Antrim, Ireland.*

2003 1899. Oct. ‡BUCKOLL, Sophie A., 17, *Chaucer St., Nottingham.*

2004 1899. Oct. CHANDLER, Chas., *Sanitary Surveyor, Bombay, India.*

2005 1899. Oct. ‡CHILD, William Wilson, 69, *Bishopthorpe Road, York.*

2006 1899. Oct. ‡COLEMAN, Frank, 48, *Andover Road, Holloway, N.*

2026 1889. Nov. ‡DAVIES, Lewis Thomas, 12, *Edward Street, Porth.*

2007 1899. Oct. ‡GASKELL, John William, 335, *Manchester Road, Hollinwood, near Oldham.*

2029 1899. Nov. ‡GOLDS, Thos. Wm., 9, *Landermer Road, Thorpe-le-Soken.*

2030 1899. Nov. ‡GRAVES, Thomas, *Borough Surveyor's Office, Kingston-on-Thames.*

2028 1899. Nov. ‡GRAY, Wm. Arthur, *Raws Tee, Wyke, Bradford.*

2027 1899. Nov. ‡HARRIES, Griffith, 66, *Bailey Street, Tonpentre, Rhondda.*

2031 1899. Nov. ‡HOWES, Thomas W., *The Nook, Thorpe St. Andrews.*

2043 1899. Dec. *M*‡HUGALL, Tom Newton, 16, *Burghley Road, Kentish Town, N.W.*

2008 1899. Oct. ‡HUNTER, John Graham, 4, *Springvale Place, Saltcoats, N.B.*

Reg. No.	Date of Election.	
2044	1899. Dec.	‡JELFS, William Thomas, *Frankley, Birmingham, Worcester.*
2046	1899. Dec.	‡KELWAY, Fred. William, 8, *Vineyards, Bath.*
2020	1899. Nov.	‡LAYLAND, William Thomas, *South Darenth, Dartford.*
2032	1899. Nov.	‡LONNON, John Imrie, 5, *St. James' Mansions, St. James' Road, Holloway, N.*
2045	1899. Dec.	‡MACDONALD, Kenneth Grant, 13, *Charles Street, St. James', S.W.*
2033	1899. Nov.	‡MACDONALD, Wm. Vincent, 1, *Kenway Road, Earl's Court, S.W.*
2034	1899. Nov.	‡MANDERS, Edward John, 14, *Wyndham Road, Canton, Cardiff.*
2009	1899. Oct.	‡MARSH, Francis Edward, *Aldridge, Stafford.*
2035	1899. Nov.	‡MARSHALL, Alfred Graham, 27, *Broughton Lane, Manchester.*
2010	1899. Oct.	‡MCCANN, William, *Belfast.*
2021	1899. Nov.	‡MIDDLETON, Ernest, 10, *Blythe Street, Wombwell, Barnsley.*
2036	1899. Nov.	*M*‡MILLER, John Edward, *Holmwood, Patrington, Hull.*
2011	1899. Oct.	‡MORRIS, William, 46, *Upper Road, Plaistow, E.*
2037	1899. Nov.	‡O'KELL, Miss Lizzie Marguerite, *The Court House, Marylebone, W.*
2012	1899. Oct.	‡RABBETTS, Charles George, 4, *Park Villas, Park Road, Colliers Wood, Merton.*
2002	1899. Oct.	‡RAMSAY, Thomas Kellett, M.R.C.V.S., *Market Drayton, Salop.*
2023	1899. Nov.	‡ROCH, David Dundas, *Mount Pleasant, Milford Haven.*
2022	1899. Nov.	‡ROCHE, Wm., 145, *Penarth Road, Cardiff.*
2013	1899. Oct.	‡ROUSELL, Albert James, *Borough Engineer's Office, Worthing.*
2014	1899. Oct.	‡SMITH, Charles P., 2, *Douglas Villas, Douglas Road, Lee, S.E.*
2024	1899. Nov.	‡SMETHURST, Robert Alexander, 4, *William Street, Beech Avenue, Urmston, Manchester.*
2038	1899. Nov.	‡STUART, Frank Donald, *Aston Fields, Bromsgrove.*
2039	1899. Nov.	‡SWAINSON, John Walker, 40, *Edge Lane, Liverpool, E.*
2040	1899. Nov.	*M*‡TOPPING, Herbert, 94, *Nelson Street, Fishpool, Bury.*
2041	1899. Nov.	WHEAR, Nathaniel Coulson, *Holbein House, Penzance.*
2015	1899. Oct.	‡YOUNG, T. D., *Westwood Villa, 19, Quadrant Road, Canonbury, N.*

EXHIBITS ADDED TO THE MUSEUM,

JULY TO DECEMBER, 1899.

Milk Pasteuriser. "The Allenbury's." Dr. Howlett's Patent; for use without Lamp or Thermometer. By this method milk is heated to 150° F., and kept at about that temperature for twenty minutes, and thus sterilises the milk without altering its flavour. *R. T. Howlett, M.D.*

Iron Pipes for Water and Gas. A number of Specimens, mounted on a board, illustrating various kinds of pipes and various methods of treatment. *J. Russell & Co.*

Prepayment Gas Meter, with mechanical and automatic arrangements for delivering a definite quantity of gas after placing one penny in the slot. *Parkinson & Co.*

Lead Pipe, gnawed by rats. *A. G. Shearing.*

Sewage Lift. Adams' Patent. A blue print drawing showing various applications of this Automatic and Siphonic Systems for lifting sewage either from high to low levels or from filter beds. *Adams & Co.*

Wychurst Channels. A set of Channels for an Inspection Chamber, illustrating this method of channelling by which splashing is diminished, and the difficulties of acute angles provided for without preventing access to drain for testing or cleaning purposes, *Jos. Cliff & Sons.*

Lantern Slides. Twenty-three Slides for illustrating the subject of [illegible] prepared for and used by the late Sir [illegible] *Lady Galton.*

Lantern Slides. [illegible] Slides, representing various Sanitary [illegible] Syphonic and Wash-down Closets, various [illegible] *Shanks & Co.*

Lead-lined Iron Pipes and Junctions for Soil pipes and Waste [illegible] iron pipes are protected [illegible] iron will both strengthen [illegible] instead of solder, and [illegible] *The Lead [illegible] Pipe Bending Co., Ltd.*

Lead Trap [illegible] waste pipes entering at various parts. *E. Mitchell.*

Laundry Appliances. Three Photographs of Machines for Washing [illegible] Steam Laundries. *W. [illegible] & Sons, Ltd.*

Anti-Splash Nozzles for fixing on taps over Sinks and Lavatories [illegible] *The Anti-Splash Synd., Ltd.*

Hard York Patent Stone. A small specimen for pavements. *The Hard York Patent Stone Co.*

Diseased Meat. Two Specimens showing Hydatid Cysts in Mesen[illegible] Tubercle on the Pleura of an ox. The [illegible] stripped from the chest wall.

SIR RICHARD THORNE THORNE, K.C.B., M.B., F.R.C.P., LL.D., F.R.S.

At the early age of fifty-eight the chief officer of the Medical Department of the Local Government Board has passed away. The fatal illness was sudden and quite unexpected. Some varicose veins became inflamed, a clot from one of them seems to have been detached and to have been carried into the general circulation, proving rapidly fatal.

Sir Richard Thorne Thorne was first officially connected with the Privy Council in 1870, afterwards the Department was transferred to the Local Government Board. In 1885, his knowledge of the French language, as well as other qualifications, led to his being selected as a delegate of the British Government at the first International Sanitary Conference, which was held at Rome; subsequently, similar conferences were held in Venice, Dresden and Paris.

In these conferences Sir Richard played an important part by insisting on the uselessness of quarantine, and the preferable, less inconvenient and more radical application of the principles of general hygiene in stamping out and arresting such maladies as plague and cholera.

Sir Richard became a member of the Parkes Museum in 1883. He was a member of the Council for many years and always took a lively interest in the Sanitary Institute, as shown by the number of papers he read before it, and by his frequently presiding over its meetings. It was only on the 13th of November, 1899, that he gave a lecture to the students entitled, "The Sanitary Inspector in Relation to the Public Health Service." The proofs of this lecture have been corrected by him, and it is published in the present Journal.

Sir Richard's views were sound and orthodox on all matters connected with his profession and with public health. He was a clear, fluent speaker, and his numerous reports, as well as his published works, show much research, and signs of great care in preparation.

Sir Richard, in private life, was amiable, courteous, and much beloved. His premature death will be severely felt among various circles.

A. W. B.

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Anningson, *Bushell, M.A., M.D.* Evolution of Human Communities in relation to Disease. 15 pp., 16mo. Reprint Public Health, August, 1895. *The Author.*

Board of Agriculture. Agricultural Returns. Statistical Tables showing acreage under crops and grass, and number of horses, cattle, sheep, and pigs in the United Kingdom, 1899. 41 pp., 8vo. London, 1899.

——— Leaflets 56, 57, 58, 60 and 61. Internal and External Parasites of Poultry. "The Canker Fungus," "The Wood Leopard Moth," "Sheep Scab." 8vo. London, 1899. *The Board.*

Bombay. Thirty-fifth Annual Report of the Sanitary Commissioner for the Government, 1898, with Appendices. 126 pp., fcp. Bombay, 1899. *Lieut.-Col. J. W. Clarkson, I.M.S.*

Bruck, L. On the Uses and Abuses of the Public Hospitals in Australia, Tasmania, and New Zealand. 74 pp., 16mo. Sydney, 1899. *The Author.*

Bruxelles. Rapports des Commissions Médicales Provinciales sur leurs Travaux pendant l'Année 1898, précédés des Observations de l'Académie Royale de Médecine et du Conseil Supérieur d'Hygiène Publique. 502 pp., 8vo. Bruxelles, 1899. *Ministère de l'Agriculture.*

——— *Ville de.* Rapport sur les Opérations de la Division d'Hygiène, Démographie, Service de Santé, Hygiene et Etat Sanitaire pendant l'annéo 1898. 43 pp., 8vo. Bruxelles, 1899. *Service de Santé.*

Budapest. Guide Technique de. 468 pp., 8vo. Budapest, 1896. Evkönyv Kiadja az orsz Közegészségi Egyesület szerkesztette, 1898 (Year Book of the Hungarian Society of Public Health). 143 pp., 8vo. Budapest, 1898. *Siebreich Károly.*

Calcutta. Report on Plague in. By J. Nield Cook, D.P.H., Health Officer. 30 pp., fp. Calcutta, 1898. *The Author.*

Clowes, *Prof. Frank, D.Sc., F.I.C., and* **Houston,** *A. C., M.B., D.Sc.* Bacterial Treatment of Crude Sewage (Second Report). 41 pp., fp. London, 1899. *Clerk to L.C.C.*

Committee of Council on Education (England and Wales). Report. 43 pp., 8vo. London, 1898–99. *Purchased.*

Dublin Science and Art Museum. Report of the Director for 1898. 19 pp., 8vo. Dublin, 1899.

Fergusson, *R. Bruce, M.A., M.B.* Aids to the Mathematics of Hygiene. 89 pp., 8vo. London, 1894. *The Publishers (Ballière, Tindall & Cox).*

Fleming, *George, F.R.C.V.S.* Tuberculosis from a Sanitary and Pathological Point of View. 39 pp., 8vo. London. *The Publishers (Ballière, Tindall & Cox).*

Fletcher, *Banister F., A.R.I.B.A., and* **Fletcher,** *H. Phillips, A.R.I.B.A.* Architectural Hygiene; or, Sanitary Science as Applied to Buildings. 268 pp., 8vo. London, 1899. *Builder* Office. *D. Fourdrinier (publisher).*

Japan. The Annual Report of the Health of the Imperial Navy for the year 1896. 105 pp., 8vo. Tokyo, 1897.
Yasuzumi Saneyoshi, F.R.C.S.Eng., Director-General.

Legge, *T. M., M.A., M.D.,* and **Sessions,** *Harold, F.R.C.V.S.* Cattle Tuberculosis. A Practical Guide to the Farmer, Butcher, and Meat Inspector. 77 pp., 8vo. London, 1898.
The Publishers (Ballière, Tindall & Cox).

Liebreich, *Dr. Oscar.* Effects of Borax and Boracic Acid on the Human System. (Translated from the German.) 44 pp., 4vo. London, 1899. *J. & A. Churchill (publishers).*

Local Government Board. Report on the Ventilation and Warming in certain of the Metropolitan Poor Law Schools, by D. N. Shaw, M.A., F.R.S. 90 pp., fcap. London, 1897.

——— Report, by Sydney Stephenson, M.B., on an Inquiry undertaken by him upon the Ophthalmic State of Poor Law Children in the Metropolis. 239 pp., fcap. London, 1897.
P. Gordon Smith, F.R.I.B.A.

——— Dr. F. St. George Mivart's Report on the General Sanitary Circumstances and Administration of the Chailey Rural District. 15 pp., fcap. London, 1899.

——— Dr. R. J. Reece's Report on the General Sanitary Circumstances and Administration of the Urban District of Aldershot, with Special Reference to the Prevalence of Fatal Diphtheria therein. 35 pp., fcap. London, 1899.

——— Dr. F. St. George Mivart's Report on the General Sanitary Circumstances and Administration of the Axminster Rural District. 23 pp., fcp. London, 1899.

——— Dr. R. Bruce Low's Report on an Outbreak of "Fever" in the Village of South Witham, in the Grantham Rural District, South Lincolnshire. 10 pp., fcp. London, 1899.

——— Report to Dr. Buchanan and Mr. R. H. Bicknell upon Inspection of fhe Gathering Grounds and Waterworks of the Corporation of Bolton. 12 pp., fcp. London, 1899,
Sir Richard Thorne Thorne, K.C.B., F.R.S.

Lydtin, *Herr A.,* **Fleming,** *G., LL.D., F.R.C.V.S., and* **Hertsen,** *M. Van.* The Influence of Heredity and Contagion on the Propagation of Tuberculosis, and the Prevention of Injurious Effects from Consumption of the Flesh and Milk of Tuberculous Animals. 175 pp., 8vo. London. *The Publishers (Ballière, Tindall & Cox).*

Maxwell, *W. H.* The Construction of Roads and Streets, with Historical Sketch of the Development of the Art of Road-making. 260 pp., 8vo. London, 1899. *The Author.*

MEDICAL OFFICERS OF HEALTH AND OTHER SANITARY REPORTS.

Bermondsey, 1898 . .. *J. Dixon, M.D.*
Calcutta, 1898 .. .. *J. N. Cook, D.P.H.*

[illegible] C.C., 1898 ...	*Major J. C. Griffith.*
Huddersfield. 2nd quarter, 1898	*E. G. Annis, M.R.C.S., D.P.H.*
Lancashire C.C., 1898 ...	*E. Sergeant, M.R.C.S.*
London, Port of. Half-year ending June 30, 1898 ...	*W. Collingridge, M.A., M.D.*
Salford, 1898	*C. H. Tattersall, M.R.C.S., D.P.H.*
St. George's, Hanover Square, 1897	*Prof. W. H. Corfield, M.A., M.D.*
St. George-the-Martyr, Southwark, 1898	*F. J. Waldo, M.A., M.D.*
Staffordshire C.C., 1898 ...	*George Reid, M.D., D.P.H.*
West Riding, Yorks, C.C., 1898	*J. R. Kaye, M.B.*
Wolverhampton, 1898 ...	*Henry Malet, B.A., M.D.*

Newsholme, *Arthur, M.D., F.R.C.P.* School Hygiene, the Laws of Health in relation to School Life. 143 pp., 8vo. London, 1898. *The Author.*

New South Wales. *Department of Labour and Industry.* Report on the Working of the Factories and Shops Act during the year 1898. 57 pp., fcp. Sydney, 1898. *Agent-General.*

Northampton, C. C. Report on the measures which should be taken to prevent the spread of Infectious Diseases, by Charles E. Paget. [illegible] *The Author.*

[illegible] Hel-[illegible] Hel-[illegible] *The Author.*

[illegible] M. [illegible]

[illegible] Treatment of Sewage. [illegible] *The Author.*

[illegible] Fever in the Netherlands [illegible] Reprint Transactions of [illegible] 1898-99. *The Author.*

[illegible] the Engineer when [illegible] Nos. 1, 3 and 4. [illegible] *The Editor.*

[illegible] Some further observa-[illegible] against Tick Fever. 16 pp., 8vo. [illegible] *J. Ashburton Thompson, M.D.*

[illegible] Meteorological Tables. Short and [illegible] determining Altitudes Barometrically, [illegible] Edition. 47 pp., pocket. London. [illegible] *The Author.*

Tallack, *William.* Penological and Preventive Principles; with special reference to Europe and America. (Second Edition.) 480 pp., 8vo. London, 1896. *The Author.*

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University of Durham College of Medicine. Calendar, 1899-1900. 163 pp., 8vo. Newcastle-upon-Tyne, 1899. *G. H. Philipson, M.A., M.D.*

Whipple, *G. C., and* **Jackson,** *D. D.* Asterionella; its Biology, its Chemistry, and its effect on Water Supplies. 25 pp., 8vo. Reprint from "Journal of New England Water-works Association." Vol. XIV. No. 1. *The Authors.*

Wilson, *F. R.* A Practical Guide for Inspectors of Nuisances. Third Edition, revised by M. Temple Wilson. 174 pp., 8vo. London, 1899. *The Publishers (Knight & Co.).*

Wylde, *W.* The Inspection of Meat. 104 pp., 8vo. London, 1890. *Purchased.*

THE FOLLOWING JOURNALS AND PERIODICALS HAVE BEEN RECEIVED DURING 1899.

WEEKLY.

British Architect.
British Medical Journal.
Builder.
Builders' Journal and Architectural Record.
Contract Journal.
Domestic Engineering.
Engineering.
Health.
Illustrated Carpenter and Builder.
Indian Engineering.
Industries and Iron.
Journal d'Hygiène.
Journal of the Society of Arts.
Lancet.
Local Government Chronicle.
Local Government Journal.
Municipal Journal of London.
Nursing Record.
Public Health Engineer.
Sanitarisch-demographisches Wochenbulletin der schweiz.
Sanitary Record.
Surveyor and Municipal and County Engineer.
Tenders and Contracts.
Veterinary Record.

MONTHLY, &c.

Analyst.
Annales des Ponts et Chausées.
British Food Journal.
Bulletin du service de santé et de l'Hygiène publique (Bruxelles).
Bulletin de la Société des Ingénieurs et Architectes Sanitaires de France.
Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege.
Direzione Generale dell' Amministrazione Civile. Bullettini Sanitario.
Engineering Magazine.
Giornale della Reale Società Italiana d'Igiene.
Iowa Health Bulletin.
Ironmongery.
Journal of the American Public Health Association.
Journal of the Royal Institute of British Architects.
Journal of the Royal Meteorological Society.
Journal of the Royal Statistical Society.
Journal of the Sanitary Inspectors' Association.
Journal of Society of Chemical Industry.
La Higiène Popolar.
La Salute Pubblica (Perugia).
La Technologie Sanitaire.
Le Génie Sanitaire.
Medical Temperance Review.
Meteorological Record.
New York State Board of Health Monthly Bulletin.
North of England Institute of Mining and Mechanical Engineers' Transactions.
Plumber and Decorator.
Proceedings of the Society for the Study of Inebriety.
Public Health.
Quarterly Record of the Royal Botanic Society of London.
Registrar-General's Returns. England and Wales, Scotland, and Ireland. Weekly, Monthly, and Quarterly.
Sanitarian (New York).
Sanitarisch-demographisches Wochenbulletin der schweiz.
Sei-i-Kwai Medical Journal.
Société d'Hygiène de l'Enfance Bulletin Mensuel.
Surveyor's Institution, Transactions of.
Technology Quarterly and Proceedings of the Society of Arts (Massachusetts).

NOTES ON LEGISLATION AND LAW CASES.

These notes are copied by permission from The Law Reports published by The Incorporated Council of Law Reporting for England and Wales.
For full text of these see Law Reports, which can be referred to in the Library of the Institute.

SEWERS.—*Discharge of sewage on to private lands—Nuisances—Claim of right for inhabitants of a parish—Injunction—Power of Sanitary Authority to stop existing and future connections with sewers—Public Health Act, 1875 (38 & 39 Vict. ch. 55), ss. 21, 299.*

In an action by a landowner against a Corporation (the Urban Sanitary Authority of the Borough of Dunstable) for an inspection to restrain them from discharging or allowing to be discharged

age upon his lands from the sewers vested in them so as to me a nuisance, the defendants set up a prescriptive right based the presumption of a lost grant by the plaintiff's predecessor in for the trustees for the benefit of the inhabitants of the Borough drain all sewage from any tenement built or to be built within the rough, and to discharge the same on the plaintiff's land. This of right failed. It was proved, however, that there were a number of houses in the Borough in respect of which prospective rights had been acquired to pass sewage into and along the sewers, that there were other houses the connection of which with the sewers had been made with the consent or by the acquiescence of the defendants.

Held, that an injunction could not be granted so as to interfere with the prospective rights that had been acquired, or to oblige the defendants to stop up the connections of the other houses which they had sanctioned, but that an injunction must be granted to restrain the defendants from authorizing or directing any sewage to flow or be discharged on to the plaintiff's lands from sewers vested in the Corporation as the Sanitary Authority.—(" Attorney-General v. Acton Local Board [1882]"; 22 ch. D. 221; and " Attorney-General v. Clerkenwell Vestry [1891]"; 3 Ch. 527, followed.)

Held, also following, (" Ainley v. Kirkheaton Local Board [1891]"; 601 J. ch. 734), that a householder had an absolute right under s. 21 of the Public Health Act, 1875, to connect his drains with a sewer, subject only to the regulations prescribed by the Local Authority, in whom the sewer is vested, as to the manner in which the connections are to be made, that therefore, that an injunction could not be granted to restrain the defendants from allowing any further connections to be made with their sewers.—(" Charles v. Finchley Local Board [1883]"; 23 ch. D. 767, dissented from on this point.)

Held, further, that the plaintiff ought to have applied to the Local Government Board under s. 299 of the Public Health Act, 1875, to make an order on the defendants to adopt a proper system of sewage for their district.—(BROWN v. DUNSTABLE CORPORATION. Justice Cozens-Hardy.)

Chancery Div. [1899]; 2 Ch., p. 378.

SEWERAGE AND DRAINAGE.—*Metropolis Management Acts—Exemptions—Volunteer Corps—Store-houses and Drill hall.*

A building consisting of an armoury, store-house, and drill hall of a volunteer corps, which is vested in the commanding officer of the corps, and is intended for the use of the corps only; is not exempt from the operation of the sanitary provisions of the Metropolis Management Act, 1855, on the ground that it is occupied and used solely for the purposes of the Crown.—(WESTMINSTER VESTRY v. HOSKINS.)

Div. Ct. [1899]; 2 Q. B. p. 474.

WATER SUPPLY.—*Riparian Proprietor—Alteration of flow of stream—Local Authority—"Injuriously affecting"—Injunction—Public Health Act, 1875 (38 & 39 Vict. ch. 55) ss. 51, 332.*

Under s. 51 of the Public Health Act, 1875, a local authority have no power for the purpose of supplying water to their district, to alter the flow of water in a stream without the consent in writing of the riparian proprietor, lower down the stream, as required by s. 332 of the Act.

By so altering the flow of water the local authority are, within the meaning of s. 332, "injuriously affecting" the common law right of such a riparian proprietor, and they will be restrained from so doing without any proof of sensib[illegible]e caused to him.—(Decision of Justice Kekewich [1899], 1 [illegible] 583, affirmed. ROBERT v. GWYRFAI DISTRICT COUNCIL). 2 [illegible]99], p. 608.

WATER.—*Alteration of na[illegible]parian owner—Injunction—Public well—Urban [illegible]—License to take water—Public Health Act, 187[illegible]t. c. 55).*

In an action by a riparian [illegible] is tenant, the occupier of a mill on the bank of a stream, [illegible]cense from an urban district council, who were in possess[illegible] land upon which the spring rose, to restrain the defendant from taking water from the spring, and from interfering from the accustomed flow of water in the said stream, the defendant contended that he was entitled to abstract the water before it had risen to the surface or flowed in a definite channel.

Held (following "Dudden v. Clutton Union, 1875,") I. H. & N. 627, that the defendant was not entitled to diminish or interfere with the natural flow of water at its source, and that the principle of that decision was not affected by the fact that at some remote period the source of the spring had been built round and formed into a polygonal well, in order to improve its mode of issuing from the earth, thus making an artificial channel for a short distance.

A local authority has no power under the Public Health Act, 1875, to license a stranger to take water from a public well for commercial purposes.—(MOSTYN v. ATHERTON. Justice Byrne, 2 Ch. [1899], p. 360.

VACCINATION.—*Mandamus—Alternative remedy—Legal remedy—Duty of Guardians to appoint vaccination officers—Vaccination Act, 1871 (34 & 35 Vict. c. 98), s. 5.*

The duty imposed upon Guardians by s. 5 of the Vaccination Act 1871, to appoint a vaccination officer, may be enforced by a writ of mandamus upon the application of the Local Government Board.—(THE QUEEN v. LEICESTER UNION.)
2 Q. B. [1899], p. 632.

DRAIN OR SEWER.—*Liability for expenses incurred—combined drain—Public Authorities Protection Act, 1893 (56 & 57 Vict. c. 61), s. 1—Public Health (London) Act, 1891 (54 & 55 Vict. c. 76) s. 4.*

A sanitary authority served notices under the Public Health (London) Act, 1891 (54 & 55 Vict. c. 76), s. 4, on the owner of premises requiring him to do certain works in respect of what was supposed to be a drain. He complied with the notices, and incurred expense in doing the work. It was discovered that the supposed drain was a sewer which the sanitary authority was liable to repair, and the executors of the owner brought an action against the sanitary authority to recover the amount of the expenses incurred, as money paid to the use, and at the request of the defendants. The action was not commenced within six months after the expenses had been paid.

Held, that the action was brought for an act done in pursuance or execution, or intended execution, of the Public Health (London) Act, 1891, within the meaning of the Public Authority Protection Act, 1893, s. 1, and ought to have been brought within six months, and therefore the defendants were not liable.—(WATERHOUSE *v.* KEEN [1825]; 4 B. and C. 200; and MIDLAND RAILWAY COMPANY *v.* WITHINGTON LOCAL BOARD [1883]; 11 Q. B. D., 788 followed; CREE *v.* ST. PANCRAS VESTRY—Justice Bruce—[1899]; 1 Q. B. p. 693.

GENERAL NOTES.

MANUFACTURE OF MATCHES WITHOUT PHOSPHORUS.—A correspondent writes from Austria that Mr. Robert Gaus, Professor at the Imperial Academy of Horticulture in Berlin, has by chance made a discovery that by means of a chemical combination, free from poison, the employment of phosphorus for the manufacture of matches can be entirely excluded.

The matches made with the material are easily ignited by friction on any suitable surface, and the process of manufacture is practically the same as the ordinary matches, only no phosphorus at all is employed.

CONGRESS ON TUBERCULOSIS.—Arrangements are being made for an Imperial Congress on Tuberculosis to be held in the Spring of 1901, under the Presidency of H.R.H. The Prince of Wales. A preliminary meeting was held at Gray's Inn Hall on December 18th, to make the preliminary arrangements. The Earl of Derby has accepted the Chairmanship of the Council, and Mr. Malcolm Morris has been appointed the General Secretary.

GENERAL INDEX.

PRELIMINARY PROGRAMME

OF THE

EIGHTEENTH CONGRESS

TO BE HELD AT

SOUTHAMPTON,

FROM AUGUST 29th TO SEPTEMBER 2nd, 1899.

THE

EIGHTEENTH CONGRESS, 1899.

WILL BE HELD AT

SOUTHAMPTON.

From AUGUST 29th to SEPTEMBER 2nd.

GENERAL ARRANGEMENTS.

ADDRESSES AND LECTURES.

President's Inaugural Address.
Lecture to the Congress.
Popular Lecture.

SECTIONS.

Section I.—Sanitary Science and Preventive Medicine.
Section II.—Engineering and Architecture.
Section III.—Chemistry, Physics, and Biology.

CONFERENCES.

Of Municipal Representatives.
Of Port Sanitary Authorities.
Of Medical Officers of Health.
Of Medical Officers of Schools.
Of Engineers and Surveyors to County and other Sanitary Authorities.
Of Veterinary Inspectors.
Of Sanitary Inspectors.
Of Ladies on Domestic Hygiene.

EXHIBITION.

An Exhibition of Apparatus and Appliances relating to Health and of Domestic use will be held in connection with the Congress.

PAPERS AND DISCUSSIONS.

The Council invite Papers on subjects relating to Health and Sanitary Science. Papers are limited to twenty minutes in reading. A short abstract must accompany every Paper, both for the convenience of the Press at the Congress and for insertion, subject to the approval of the Council, in the Journal of the Institute, should it not be deemed desirable to publish the Paper *in extenso*. No previously published Paper can be read. The acceptance of Papers, and the days on which they are to be read, are determined by the Council before the beginning of the Meeting. The Council reserve the right of refusing any Papers sent in; and in the case of those accepted, the reading of them must depend on the time at the

disposal of the Meeting. Papers read at the Congress cannot be published by the Authors, except by permission of the Council. The Council reserve to themselves the privilege of printing any Paper read at the Congress, either wholly or in part, or of refraining from the publication thereof, if they see fit.

The Addresses and Papers or Abstracts thereof are usually printed by the Institute in London before the meeting of the Congress, and may be purchased from the Secretary of the Institute during the Congress. Authors should forward their manuscript by post *as early as possible, and in any case not later than July 31st*, addressed to the Secretary, Sanitary Institute, Margaret Street, London, W.

RECEPTION ROOM AND PLACES OF MEETING.

A Reception Room will be opened at The Hartley College, on Monday, August 28th, at 12 Noon, and on the following days at 9 a.m., for the issue of all Tickets in connection with the Congress. The Reception will be available for Reading, Writing, and Conversation.

The Inaugural Address of the President and the Lecture to the Congress will be given in Hartley College.

The Sectional Meetings, General Meetings, and Conferences will be held in Hartley College, and Council Chamber, Municipal Offices.

The Popular Lecture will be given in Hartley College.

HOTEL AND LODGING ACCOMMODATION, AND TRAVELLING ARRANGEMENTS

Will be determined by the Local Committee, and information relating to the same may be obtained from the Honorary Local Secretaries, Municipal Offices, High Street, Southampton, and from the Secretary of the Institute.

TICKETS.

Fellows, Members, and Associates of the Institute, are supplied with Tickets for the Congress on application to the Secretary before the Congress, or may be obtained at his Office in Hartley College during the Meeting.

To those not connected with the Institute, Congress Tickets will be issued, entitling the holder to the use of the Reception Room, to admission to the Presidential and other Addresses, to all Meetings, to the Exhibition of the Institute, and to any Conversazione given by the Institute. The price of the Congress Tickets is Half-a-Guinea each. These Tickets may be obtained at the Office of the Hon. Local Secretaries at Municipal Offices, High Street, Southampton, or at the Offices of The Institute, 72, Margaret Street, London, W.

EXCURSIONS.

Particulars of these will be published in a later Programme, and Tickets and List of Places to be visited can be obtained either at the Secretary's Office, or the Office of the Hon. Local Secretaries during the Meeting.

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East Cowes.
Eastleigh.
Epsom.
Failsworth.
Fareham.
Farnborough.
Farnham.
Farnworth.
Flint.
Folkestone.
Govan.
Hanwell.
Hastings.
Haworth.
Hertford.
Heywood.
Hollywell.
Hooe.
Itchen.
Jarrow.
Kearsley.
Kingston-on-Thames.
Kirkintilloch.
Lanark.
Larne.
Leith.
Lewes.
Leyton.
Linlithgow.
Linthwaite.
Lisburn.
Litherland.
Littleborough.
Liversedge.
Lowestoft.
Lymington.
Maidenhead.
Maidstone.
Mallroyd.
Midsomer Norton.
Montrose.
Much Woolton.
Newport Pagnell.
New Kilmainham.
Newport, I. of W.
Oldbury.
Oxenhope.
Penzance.
Penmaenmawr.
Penryn.
Pershore.
Pontypridd.
Portslade-by-Sea.
Reigate.
Romsey.
Royston.
Ryde.
St. Austell.
Sandown.
Scarborough.
Scunthorpe.
Seaford.
Shanklin.
Shipley.
Slough.
Southall, Norwood.
Southend-on-Sea.
Southport.
Stockton-on-Tees.
Surbiton.
Swindon New Town.
Swindon, Old.
Taunton.
Tavistock.
Tewkesbury.
Thornhill.
Tipton.
Tonbridge.
Torquay.
Tunbridge Wells.
Tunstall.
Tynemouth.
Ulverston.
Ventnor.
Wallasey.
Warley.
Warrington.
Warsop.
Watford.
Weymouth.
Wick.
Wilton.
Winsford.
Winton.
Withington.
Weston-super-Mare.
Wood Green.
Worsley.
Yeovil.
Ynyscynhaiarn.

Rural District Councils (30).

Ashby-de-la-Zouch.
Basford.
Bath.
Belper.
Blackwell.
Bodmin.
Bootle.
Bucklow.
Caistor.
Dover.
Epsom.
Glanford Brigg.
Hemsworth.
Hunslet.
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Isle of Wight.
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Kidderminster.
Maidstone.
Nantwich.
Newport Pagnell.
New Ross Union.
Newton Abbott.
New Winchester.
Retford, East.
South Dublin Union.
Tadcaster.
Warwick.
Wirrall.
Wortley.

Port Sanitary Authorities and others (11).

Barnstaple Port Sanitary Authority.
Chester Port Sanitary Authority.
Gloucester Port Sanitary Authority.
Haslingden, Rawtenstall, and Bacup Outfall Sewerage Board.
Hull and Goole Port Sanitary Authority.
Liverpool Insanitary Property and Artizan's Dwellings Committee.
Liverpool Port Sanitary and Hospitals Committee.
Metropolitan Asylums Board.
Richmond Main Sewerage Board.
River Tyne Port Sanitary Authority.
West Riding of Yorkshire Rivers Board.

School Boards (2).

Northampton.
Wigan.

Societies who have appointed Delegates to the Congress.

(65)

[illegible]

Proceedings of the Congress and Officers of Sections and Conferences.

Inaugural Address to the Congress

By Sir WILLIAM H. PREECE, K.C.B., F.R.S., Pres.Inst.C.E.

Conversazione and Reception

By HIS WORSHIP THE MAYOR (Councillor G. A. E. Hussey).

Water Party. Afternoon Tea and Trip round the Isle of Wight.

To be given By DIRECTORS OF THE LONDON AND SOUTH-WESTERN RAILWAY. (Limited to 200.)

Lecture to the Congress on "Tuberculosis."

By MALCOLM MORRIS, F.R.C.S.Edin., M.R.C.S.Eng.

Popular Lecture on "Glasgow Infectious Diseases Hospital."

By BAILIE J. DICK, J.P.

For time and places of Meetings see page 23.

SECTIONAL MEETINGS.

Sect. I.—"Sanitary Science & Preventive Medicine."

August 31*st and September* 1*st, to be held in* Hartley College.

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Sir Joseph Ewart, M.D., F.R.C.P., M.R.C.S., J.P.

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MAJOR LAMOROCK FLOWER, F.R.MET.SOC., LONDO

Section III.—"Physics, Chemistry, and B

August 31*st and September* 1*st, to be held in* HARTLEY

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PROF. D. R. BOYD, B.SC., PH.D.
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CONFERENCES.

Of Municipal Representatives.

Wednesday, August 30th, to be held in HARTLEY COLLEGE.

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Chairman of the Health Committee, Southampton.

Vice-Presidents.
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ALD. ALBERT J. COOMBES (Chairman of Sanitary Committee, Ryde).
WILLIAM H. FORDER (Mayor of Winchester).
COUNC. E. GAYTON.
W. HOARE (Mayor of Bournemouth).
COUNC. HOLLIS (Chairman of Sanitary Committee, Brighton).
H. M. JULIAN (Mayor of Basingstoke).
ALD. H. W. KEAY (Mayor of Eastbourne).
W. LOCKE (Mayor of Ryde).
JOHN ROLSTON, M.D., J.P. (Chairman of Sanitary Committee, Devonport).
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NEVILLE STRANGE (Chairman of Sanitary Committee, Eastbourne).
ALD. G. J. TILLING, J.P.

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HENRY WHITE, EASTLEIGH.

Recording Secretary.
J. EDWARD WILLCOX, ASSOC.M.INST.C.E., BIRMINGHAM.
This Conference is open to all Members and Officials of Municipal Bodies.

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Wednesday, August 30th, to be held in HARTLEY COLLEGE.

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Chairman Port of London Sanitary Authority.

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ALD. WALTON SMITH (Chairman of Port Sanitary Authority, Manchester).

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Wednesday, August 30th, to be held in HARTLEY COLLEGE.

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This Conference is open to all Medical Officers of Health.

Of Medical Officers of Schools.

Wednesday, August 30th, to be held in HARTLEY COLLEGE.

President.

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Of Engineers and Surveyors to County and other Sanitary Authorities.

Wednesday, August 30th, to be held in HARTLEY COLLEGE.

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County Surveyor, Nottingham.

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Recording Secretary.

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This Conference is open to all Municipal and County Engineers.

Of Veterinary Inspectors.

Wednesday, August 30th, to be held in HARTLEY COLLEGE.

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Vice-Presidents.

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Recording Secretary.

VETY.-MAJOR R. ROWE, A.V.D., M.R.C.V.S., SOUTHSEA.

Of Sanitary Inspectors.

Wednesday, August 30th, to be held in HARTLEY COLLEGE.

President.

CHARLES MACMAHON,
Chief Sanitary Inspector, Torquay.

Vice-Presidents.

W. BLAND (Chairman North-Western & Midland Sanitary Inspectors' Association).
G. W. BRANSON (Chairman North Hants and Adjoining Counties Branch).
T. J. MOSS FLOWER (Chairman of the Sanitary Inspectors' Association).
W. LLOYD-MARKS (Chairman South Wales and Monmouthshire Sanitary Inspectors' Association).
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W. GRANT, EASTBOURNE.
J. W. KIRLEY, BRISTOL.

Recording Secretary.

ALBERT TAYLOR, LONDON.

Arrangements have been made for a Sea Trip to Bournemouth and back on Friday, September 1st.

This Conference is open to all Sanitary Inspectors and Inspectors of Nuisances.

On Domestic Hygiene.

Wednesday, August 30th, to be held in COUNCIL CHAMBER, MUNICIPAL OFFICES.

President.

Mrs. CONSTANCE PATEY.

Vice-Presidents.

Mrs. RICHARD ANDREWS.
Mrs. DURST.
LADY KATHLEEN ELIOT.
Mrs. G. A. E. HUSSEY (Mayoress of Southampton).
Mrs. F. WILLAN.
Hon. Mrs. ELIOT YORKE.

Secretaries.

Miss N. F. DE CHAUMONT, LONDON. | Mrs. A. B. WESTON, SOUTHAMPTON.

Recording Secretary.

Miss ALICE RAVENHILL, LONDON.

This Conference is open to all Ladies interested in Domestic Hygiene.

Order of Proceedings.

TUESDAY, AUGUST 29TH.

12.30 p.m.—Reception of the Members of the Congress in the Lecture Hall, Hartley College.

1.30 p.m.—Public Luncheon in the Pavilion, Royal Pier.

3 p.m.—Inaugural Address to the Congress in Lecture Hall, Hartley College.

8.30 p.m.—Opening of the Health Exhibition in Victoria Hall and Royal Victoria Rooms.

WEDNESDAY, AUGUST 30TH.

9.30 a.m. to 2 p.m.—Conferences in Hartley College and Council Chamber, Municipal Offices.

(See pages 19—22).

8.30 p.m.—Conversazione and Reception in the Pavilion, Royal Pier, by The Mayor of Southampton.

THURSDAY, AUGUST 31ST.

10 a.m. to 2 p.m.—Meetings of Section I. *(See pages* 17, 18.)—Sanitary Science and Preventive Medicine. Section II.—Engineering and Architecture. Section III.—Physics, Chemistry, and Biology in Hartley College.

Presidents' Addresses, Papers and Discussions.

Water Party. Afternoon Tea and Trip Round the Isle of Wight to be given by the London and South Western Railway Company.

8.30 p.m.—Lecture to the Congress in Hartley College.

FRIDAY, SEPTEMBER 1ST.

10 a.m. to 2 p.m.—Meetings of Section I.—Sanitary Science and Preventive Medicine. Section II.—Engineering and Architecture. Section III.—Physics, Chemistry, and Biology in Hartley College.

1.30 p.m.—Closing General Meeting of the Congress in Hartley College.

8.30 p.m.—Popular Lecture in Hartley College.

SATURDAY, SEPTEMBER 2ND.

Excursions.

Driving Excursion to Lyndhurst, Bolderwood, Rufus Stone, &c.

Other Excursions and Visits to places of interest will be made during the Congress.

[*Particulars will be given in future Programmes.*]

Subjects Suggested for Discussions or Papers.

How to secure the Best Standard of Private Vaccination.
Vaccination Stations at Seaports.
Recognition and Isolation of Pulmonary Tuberculosis.
The Tubercle-Bacillus as a Saprophyte.
Precautions against the Importation of Plague into Europe.
Venereal Diseases.
The Prevention of Malarial Diseases.
Guarantees for the Purity of Milk Supplies.
Control and Inspection of Imported Meat.
Public Slaughter-Houses.
Granting of Sanitary Certificates by Sanitary Authorities.
Status of Sanitary Inspectors.
Nationalisation of Health.
Bye-Laws.
Diseases of Animals conveyed by Milk.
Difficulties of dealing with Tuberculosis in Cattle.
Gannister Disease.
Importance of Examining the Eyes of School Children.
Observations on the Plague.
Cubic Space per head for Crews in Mercantile Marine Service.
Preservatives in Butter and Milk.
Combined House Drains.
Cottages for Agricultural Labourers.
Control of Ice Cream Manufacture.
The Public Health Value of Crèches and Nurseries for Infants and Children.
Drainage of Buildings possessing no Open Space.
Main Intercepting Sewers.
New Main Sewerage and Sewage Disposal of Southampton.
Vent or Ventilation of Sewers.
Biological Purification of Sewage.
Workmen's Houses.
Smoke Abatement.
The Collection and Storage of Flood-Waters and the Purification of such Waters.
The Use of Cisterns, other than Water-Waste Preventers, in the Constant Service System of Supply.
The Establishment of Joint Committees for Watershed Areas.
The Advantages of Main Intercepting Sewers.
Sanitation of Passenger Ships.
The Construction of the Sanatoria for Tuberculosis.
The Disposal of Dejecta from Sanatoria for Tuberculosis.
Precautions against the Importation of Small-pox by Passenger Ships.
Chemical Purification of Sewage.
Provision and Laying-out of Public Pleasure Grounds in small Towns.
Isolation Hospitals.
Municipal Lodging Houses.
Connection between Local Government and Domestic Sanitation.
Practical Hygiene Teaching in Schools.
Care of Teeth during School Life.
National Evil of Child Labour.
Domestic Sanitation for Housewives.
Some Causes of Infantile Mortality in England.
Health Aspects of Occupation for Women.
Work of Women Health Missioners.
Need of Teachers holding recognised Certificates In Hygiene.

THE HEALTH EXHIBITION

WILL BE HELD IN

Victoria Hall and Royal Victoria Rooms,

SOUTHAMPTON,

On TUESDAY, AUGUST 29th, and will remain open till SEPTEMBER 23rd, 1899.

The Exhibition is held in connection with the Eighteenth Autumn Congress of The Sanitary Institute, and includes Sanitary Apparatus and Appliances, and Articles of Domestic Use and Economy.

The Principal Boroughs throughout the Kingdom have appointed Delegates to the Meeting, in addition to the Members and ordinary visitors, so that the Exhibits will be brought under the notice of Members of Corporations and Officials from all parts of the country.

The Buildings for the Exhibition are near the centre of the town and places of meetings for the Congress.

Applications for Space must be made on the Official Form and under the proper Class. They must be sent to Mr. W. H. Knight, the Curator of the Exhibition, at the Offices of the Institute, Margaret Street, London, W., not later than Tuesday, August 1st, 1899.

The Scale of Charge for Floor Space is 15s. per Foot frontage, with a depth of six feet. Corners and Special Places are charged at higher rates. Wall space, 1s. per square foot. No Floor Space will be allotted for less than three feet frontage, or Wall Space for less than five square feet. *All charges must be paid at the time of allotment.*

Silver and Bronze Medals will be awarded at the discretion of the Judges, and their decisions will in all cases be final. A complete classified List of all Awards from the commencement of the series of Exhibitions is published by the Institute.

Protection in accordance with the Patents, Designs, and Trade Marks Act, 1883, will be obtained from the Board of Trade for persons desirous of exhibiting New Inventions.

Forms of Application for Space and other particulars can be obtained of the Curator at the Offices of the Institute, 72, Margaret Street, W.

OBJECTS OF THE INSTITUTE, RULES FOR THE ADMISSION OF MEMBERS, &c.

The Objects of the Institute are: To promote the advancement of Sanitary Science in all or any of its branches, and to diffuse knowledge relating thereto.

Sessional Meetings of the Institute are held in London from time to time, for the reading of papers and for discussions upon subjects connected with Sanitary Science.

Journal.—The Journal of the Institute is published quarterly, each part containing about 170 pages. It includes, besides the papers and discussions at the meetings of the Institute, a number of other items of interest to those working in Public Health, a descriptive epitome of the titles of all articles appearing in the various British and Foreign Journals, reviews of Sanitary publications, notes on laws cases and legal decisions relating to public health matters, and general notes. The Journal is supplied free of charge to Members and Associates of the Institute.

Courses of Lectures and Demonstrations for Sanitary Officers, specially adapted for Candidates preparing for the Institute's Examination for Inspectors of Nuisances, are held twice a year in London, and at intervals in the Provinces, preceding these Examinations; a nominal admission fee is charged for each course.

Other Lectures on Sanitary matters, such as Sanitation of Industries, Meteorology in relation to Hygiene, are arranged from time to time by the Council.

Examinations are held, and Certificates of Competency in Sanitary knowledge are granted. The Examinations at present arranged are in Practical Sanitary Science; Inspectors of Nuisances under the Public Health Act, 1875; Inspectors of Meat and other Foods; Practical Hygiene for School Teachers. The Examinations are held in London and also in Provincial centres.

A Congress for the consideration of subjects relating to Hygiene, and an Exhibition of Sanitary Apparatus and Appliances, are held by the Institute.

In connection with the Meeting, Conferences are held for Medical

Officers of Health, for Borough Surveyors, for Inspectors of Nuisances, and for Ladies.

The Parkes Museum, which is maintained by the Institute, contains a great variety of the most approved forms of apparatus and appliances relating to health and domestic comfort.

Professors and Teachers of Hygiene are allowed the use of the Museum for Demonstrations to their Students on application to the Committee.

The Museum is open daily from 10 a.m. to 6 p.m., and on Mondays to 8 p.m., and is free to the public except when Lectures or Meetings are being held.

There is a large Library of Sanitary Literature, which contains, in addition to standard works on Sanitary Science, a collection of Reports of Medical Officers of Health over the whole country; and a Reading Room supplied with the principal Sanitary periodicals, both home and foreign.

The Council will be glad to receive from Authors of works on Hygiene and the allied Sciences copies of their books to place in the Library.

The Library and Reading Room are open daily, from 10 a.m. to 6 p.m., except on Saturday when it is closed at 2 p.m., for the use of Members, Associates, and Students.

Honorary Fellows.—Foreigners distinguished in connection with sanitary science can be elected by the Council. Honorary Fellows are not corporate members of the Institute.

Fellows are elected by the Council from the Members of at least one year's standing, on one or other of the following grounds:—

1. That he is an eminent man of science. 2. That he is a person of distinction as a legislator or an administrator. 3. That he is a person who has done noteworthy sanitary work.

Members are elected by ballot by the Council. The Annual Subscription payable by a Member is £2 2s.

Any person elected a Member who shall either be a Public Officer whose duties are connected with Public Health, a holder of a Certificate of Sanitary Knowledge from some Examining body (the sufficiency of which Certificate shall be recognised by the Council),

erson r ding abroad during the period of such residence, shall r the smalle Annual Subscription of £1 1s.

Members desirous of becoming Life Members may do so on payment £21, in lieu of the Annual Subscription.

Associates are elected by ballot by the Council. The Annual cription payable by Associates is £1 1s.

ociates who at the time of their election shall either have ved the Certificate of the Sanitary Institute of Great Britain or nis Institute, of competency for the appointment of Inspector Nuisances, or appointment of Inspector of sances in any of the incorporation of the tute, shall Subscription of 10s. 6d.

sociates are not s of the Institute.

ssociates desirous fe Associates may do so on ent of £10 10s. in nual Subscription.

orms of applica ssion to the Institute, and the ninations; and al ion, can be obtained from the etary.

Kenny & Co., Printers, 25, Camden Road, London, N.W.